1971-03

Analysis of insurgent incidents in thailand (U).

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Monterey, California ; Naval Postgraduate School

http://hdl.handle.net/10945/15572

UNITED STATES NAVAL POSTGRADUATE SCHOOL

THESIS

ANALYSIS OF INSURGENT INCIDENTS IN THAILAND (U)

by

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March 1971

[redacted]

This document contains 127 pages.

[redacted] (Contents of this page are Unclassified)

Analysis of Insurgent Incidents in Thailand

by

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN OPERATIONS RESEARCH

from the

NAVAL POSTGRADUATE SCHOOL
March 1971

ABSTRACT

(U) A general survey is made on the data collected by the Village Information System, Thailand project. Principal component analysis and principal factor analysis data reduction techniques are applied to the data for selected areas in northeast Thailand and the results are compared. Algebraic models are applied to a selected variable of the data and forecasting techniques applied to each model to predict the value of the variable in the next time period. Conclusions are presented concerning the operational usefulness of the analytical techniques applied to the data.

TABLE OF CONTENTS

LIST OF TABLES

I. INTRODUCTION (U)

A. PURPOSE (U)

(U) This thesis continued the study of insurgency incident reports from Thailand which was begun in a thesis by Major P. E. Gardner, USMC [1]. Gardner described and documented the development of the insurgency in Thailand, within the security classification level of this document, and the establishment of the Village Information System, Thailand project to collect and process data concerning the insurgency. That information is available and will not be repeated here.

B. SCOPE OF ANALYSIS (U)

(U) An expanded data base, containing approximately four times the initial number of incident reports, was available for this thesis. This data base was surveyed with respect to the information it purported to contain, information it was believed it should contain, the manner of presentation of the collected information, and the observed information in the incident report files themselves. These areas were evaluated, critiqued, and recommendations made for changes or additions which the author believed might improve the usefulness of the data base. It was fully realized that such a survey and recommendations could only be made in a very general sense since the author was several thousand miles away, had no personal experience concerning the insurgency or counter-insurgency activities in Thailand, and had only the data tape and a few after-action and trip reports relating directly to the data base for the thesis.

(U) The factor analysis technique applied by Gardner was applied to the expanded data for the same areas, and the resulting factor patterns compared with those obtained by Gardner. Two different techniques of factor analysis were then applied to a new major geographical area and its major subdivisions. The two factor analysis techniques were compared for the different size data sets and also using sets of generated data with known underlying probability distributions for the variables under consideration.

(U) Prediction of levels of insurgent activity based on the information contained in the data was considered. Criteria for predictions and forecasting techniques in a counterinsurgency environment were developed, and three algebraic forecasting models were presented, applied to six geographical areas representative of different patterns of insurgency, and evaluated for applicability and usefulness as an aid in conducting a counterinsurgency program.

(U) It will be noted that there are some variations in the number of incident report files from a given area in different phases of the analysis effort. This was a result of the elimination, either manually or by the computer, of some incident report files counted in the total of 6264 reports constituting the data base. The eliminated files were those in which information was missing in the variables necessary for a particular analysis.

C. CLASSIFICATION (U)

(U) The overall security classification of this thesis is CONFIDENTIAL, Not Releasable to Foreign Nationals. The information on the data tapes is UNCLASSIFIED as recorded, but the description of an incident report in terms of the variable code definitions is CONFIDENTIAL. As the material is concerned with the collection and evaluation of intelligence information, it was placed in Group-3 in accordance with Department of Defense Directive 5200.10.

II. VILLAGE INFORMATION SYSTEM, THAILAND (U)

(U) The background and development of the Village Information System, Thailand (VIST) project has been described and documented by Gardner [1], and no further information in these areas was received. A second magnetic tape of VIST incident data (VIST Task 2) was made available by the Stanford Research Institute subsequent to the completion of the analysis by Gardner, and it was this second, expanded base, tape which provided the data set for the analysis which was conducted in the preparation of this thesis.

A. EXPANDED VIST DATA SET (U)

(U) The data set used contains 6264 incident files, compared to 1592 in the initial set, for a 33 month period from January 1967 through September 1969. The 80 column format for an incident file is shown in Appendix A. In addition to providing coverage for an enlarged time span, the expanded data set also increased the area coverage from six Changwats to seven and added many Amphoes to the initial six Changwats. The expanded list of geographical areas and their codes are shown in Appendix B.

B. GENERAL ANALYSIS OF VIST DATA (U)

(U) Before any attempt was made to apply statistical or mathematical techniques of analysis to the data set, a general critical survey of the data was conducted so that a basic evaluation of the data set could be made. This survey considered both the overall aspects of the incident data reporting and recording system within the VIST project with respect to the 80 column coded representation of a report, and the specific elements of reported information contained within the data set.

1. <u>The Incident Reporting System</u>

(C) The failure of the VIST project to proceed into Task 3, the reporting and recording of Royal Thai Government (RTG) forces data, seemed to be the greatest weakness of the VIST project from the point of view of usefulness of the coded data. Regardless of the amount of analysis performed or the analysis techniques applied, the results would still have to be interpreted as only a one-sided picture of Communist Terrorist activity. In the absence of information concerning RTG counter-insurgency forces and operations, both military and civic action; there was no way to make interpretations of significant underlying cause-effect relationships which might be indicated by the results of data analysis. An increase in insurgent activity followed by a sharp decrease in a given area could indicate aggressive and successful RTG counterinsurgency operations or a virtual ceding of the area to Communist Terrorist control. In the same manner, periodic cycles of varying amplitude could be indicative of the effectiveness of RTG counterinsurgency programs in retaining control of an area against a persistent Communist Terrorist offensive, with the cycles being caused by the time lag factor in resupplying personnel and equipment to the insurgent organization from outside

Thailand following an unanticipated insurgent program setback; or it could be the effects of local weather on insurgent mobility. In this regard it was noted that the local weather was not an item of information reported.

(C) The second major element of the reporting system considered was that the data information contained in an incident file represented a report received under an incident code and not a single, exclusive representation of an event. The incident codes are listed and defined in Appendix C. After several series of successive reports were reviewed from different geographic areas the following hypothetical event was constructed:

> A Communist Terrorist courier was sighted by a police patrol boat while crossing the Mekong from Laos. The courier was apprehended the next day approximately 15 kilometers from the border crossing point while trying to avoid a checkpoint set up by the Regional Force in response to the police alert. The courier was carrying mail addressed by Vietnamese name only and an operational directive for a planned increase in armed propaganda and terrorism. After being transferred to an RTA Interrogation Center, the courier revealed the location of two base camps he was to service in the mountains and the general location of his point of departure, a headquarters and training center, located in Laos.

The inflation factor was apparent, but it was also apparent that the majority of the incident codes were not readily subject to multiple incident reports. The inflation factor was considered significant however, based on the relatively small numbers of incidents occurring per month in most amphoe size areas, particularly with respect to total incident level forecasting. One method of reducing multiple reporting of one event or instance of Communist Terrorist activity would be the assignment of an identification "tag" to an event, such as a firefight, where this tag would be an element of all reports resulting from the examination of documents or the interrogation of prisoners obtained as

a result of the encounter. Another approach would be the review of the incident reporting codes to eliminate those items which are essentially of intelligence interest only and do not constitute events in space or time. Rarely, if ever, is the capture of a document an isolated event or of significance in itself; the significance, if any, stems from the information contained within the document which can be exploited by the RTG in its counterinsurgency program.

(C) Within the format of the data elements coded (Appendix A), the categories of: incident reporter, incident initiator, and incident target require a total of 16 columns of 0 or 1 entries. Since each of these categories is partitioned, numerical coding of the variables could represent the same information in three columns.

2. <u>The Reported Information</u> (U)

(U) It was discovered that a useful aid in an overall analysis of the information content of the VIST data was a by-product of computer analysis routines performed on the data, namely, a listing of the means and standard deviations of the variables under consideration. The listing for the total data set, 6264 incident report files, is shown in Table I.

TABLE I

OBSERVED DATA PARAMETERS

VARIABLE	MEAN	ST.DEV.
1	26.131195	18.011444
2	0.171372	0.376819
3	0.274179	0.446067
4	0.070362	0.255772
5	0.108319	0.310793
6	0.147906	0.354994
7	0.217509	0.412522
8	0.048523	0.214827
9	0.013565	0.115676
10	0.028411	0.166154
11	0.172968	0.378213
12	0.004628	0.067870
13	0.078781	0.269410
14	0.076390	0.265678
15	0.038309	0.191950
16	0.052996	0.223996
17	0.001117	0.033409
18	14.444157	9.418326
19	5.786589	3.274970
20	0.468303	0.498937
21	0.042939	0.202728
22	0.109432	0.312135
23	0.024739	0.155335
24	0.492889	0.499886
25	15.070463	41.106903
26	0.678805	9.149450
27	8.531009	8.106230

(U) The analysis effort was placed primarily of the means of the variables since no specific interpretation or significance could be assigned to the variance of a dichotomous, zero-one, variable.

(C) Variable number one was the incident code reported. When the incident codes (Appendix C) were studied, it was concluded that there was a sufficient ordering underlying the values of this variable, from more violent to less violent with increasing magnitude of the variable, for comparisons to be made. This ordering was very fundamental and very dependent on the interpretations of the definitions of the incident codes since the definitions are not unambiguous. The numerical gaps in the code and the predominance of nonviolent codes, which seemed to have a lower degree of ordering than the violent codes, forced the conclusion that no useful meaning could be assigned to the absolute numerical value of the mean for any geographical area or time span. However between different areas or time spans, the difference in the means would provide, in a very general sense, a relative measure of the degree of violence associated with the insurgency activity. The significance of such a measure was considered to be derived from degree of violence as an indicator of phase progression in the generally accepted formula or model of a Communist-type insurgency or war of liberation.

(C) Variables two through seven constituted the reporter of the incident. Since the six variables constitute a partition of the set of incident reporters, it was expected that the mean value of a variable would indicate the propertion of the total incidents reported by that variable. The sum of these means was equal to .989647 which indicated that the identity of the originator of the incident report was recorded on the report and transferred to the data set for about 99 per cent of the reports in the data base. Variables eight through twelve constitute a partition of the set of incident initiators. The sum of these

[illegible]

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means was .268095 with the mean of the unknown initiator variable (Variable 12) equal to .004628. If it had been the case that the sum of the means was nearly equal to one, the means would have been useful as indicators of the proportions of activity initiated by government forces and insurgent forces. No explanation was found for the high proportion of incident files with no information recorded in this category, and, with only about 27 per cent information, the application of proportions to the total recorded was not considered to be a valid technique for approximating the actual proportions which would have been available without missing data. The same situation was observed in the consideration of variables thirteen through seventeen, the target of the incident category, where the sum of the means was equal to .247593, with the mean of variable seventeen (questionable target) equal to .001117. It was noted however, that all the variables in this category tended to reflect incidents which would be initiated by insurgents and not government forces. The largest proportion of the recorded information concerning the initiator of incidents corresponded to Communist Terrorists, but the next largest proportion corresponded to the Royal Thai Army initiated incidents. It was conjectured that the fact this category had the lowest sum of means might stem from a feeling among report originators that the category was not exhaustive and no entry at all might be better than an erroneous entry.

(C) Considering the completely ordered variables; day of month (Variable 18), month (Variable 19), and hour of day (Variable 27): the means and standard deviations were both evaluated. In the case of the day of month and month variables, the observed means and standard

deviations correspond closely to the expected means and standard deviations of random variables with a uniform distribution over the appropriate intervals, as shown by:

	Observed		Expected (U(1, 30) or U(1, 12))	
	Mean	Standard Deviation	Mean	Standard Deviation
Day	14.444157	9.418326	15.5	8.09
Month	5.786589	3.274970	6.5	3.18

The mean of the hour of day is less than the expected mean by a factor of 2/3, and the standard deviation less by a factor of 1/2. The indication was that the preponderance of incidents took place in the morning hours rather than being uniformly distributed throughout the day or the average daylight hours.

(C) With respect to the people involved (Variables 21 through 26), it was noted that while the average incident involved 15 Communist-Terrorists, the standard deviation of this variable was almost three times as large as the mean. This would tend to reduce the value of the mean of this variable as a comparative indicator. It was also observed that approximately one half of all incident reports included a positive response to Variable 24 (other ethnic groups). Dependent on the judgement of operational usefulness of ethnic information, it could be worthwhile to expand the ethnic variable categories, or to generate a numerical code for the groups to be included in this variable.

[illegible]

III. FACTOR ANALYSIS (U)

(U) An objective in the analysis of a large set of data which has the potential of producing significant or useful results, is a reduction in the size of the data set. If this can be done without destroying the useful value of the information contained in the data, the result is a smaller set of data to manipulate, thus simplifying additional analysis efforts. It is the objective of factor analysis to represent a set of variables in terms of a smaller set of factors which can be constructed from the data.

(U) The simplest model for representing one variable in terms of other variables is the linear model which is used in most factor analyses. Within the linear framework there are two distinct approaches: to extract the maximum variance from the data, or to maximally reproduce the correlations among the variables. Harmon [2] and Morrison [3] were considered to be the better references for the material which follows. For consistency, the notation provided by Harmon was used wherever possible.

A. PRINCIPAL COMPONENTS ANALYSIS (U)

(U) The method of principal components empirically reduces a large set of data so that n original variables are describable in terms of F uncorrelated components. If x_j is an original variable, the model is

$$x_j = a_{j1}F_1 + a_{j2}F_2 + \ldots + a_{jn}F_n \quad (j = 1, 2, \ldots, n). \tag{3-1}$$

All n components are required to reproduce the correlations among the n original variables, but each component, in turn, makes a maximum contribution to the sum of the variances of the original variables . That is, F_1 is that linear combination of the n original variables

which contributes a maximum to the sum of the variances of the original variables, F_2 contributes a maximum to the remaining variance, and so on; with the sum of the variances of the n principal components being equal to the sum of the variances of the n original variables. Consequently, depending upon the amount of total variance which it is desired to retain in the reduced data set, only a small number of the components will be required to represent the original data in a practical application of the method.

1. Geometric Interpretation (U)

(U) The principal components solution can be described geometrically by considering a scatter of p observed values of the n variables in n-space. Harmon [2] proves that for the principal component solution, where the rank of the correlation matrix is n, that the common-factor space for these observations is n-dimensional. The swarms of points will be generally concentric, similiar, and similarly situated ellipsoids; exactly so for a normally distributed population [7]. If the major axis of the ellipsoid is defined as the axis passing through the direction of maximum variance of the points, Morrison [3] shows this major axis corresponds to the first principal component when the axis is rotated to maximize variance. The maximizing solution would be the characteristic vector of the greatest root (eigenvalue) of the sample correlation matrix. The remaining roots and characteristic vectors of the correlation matrix would then determine the orientation of the higher ordered principal component axes. The geometric interpretation also implicitly contains the minimizing of the sums of squares distances from each point to its projection on each of the successive n coordinate axes. Minimization of the sums of squares distances is equivalent to the

maximization of variances, and an orthogonal least-squares solution to the best fitting line to the swarm of points would yield the first principal component axis directly. Successive orthogonal least-squares solutions would yield the remaining n-1 axes.

2. Limitations of Principal Components (U)

(U) Principal components was described above as being highly dependent of the sums of the variances of the original variables. If these variables are not measured in the same units, changing the scale or performing other linear transformations of the variables could so change the shapes of the ellipsoids until the axes (principal components) would have no consistent meaning and the results of the analysis would not be useful in any practical sense.

B. CLASSICAL FACTOR ANALYSIS (U)

(U) Classical factor analysis (which will be referred to as factor analysis in the following discussion to distinguish the classical factor analysis model from the principal components analysis model) generally uses the second approach to factor analysis in that the model is basically designed to maximally reproduce the correlations among the original variables. The model describes each of the original n variables (x_i, $i = 1, 2, \ldots, n$) in terms of m common factors and a unique factor by

$$x_i = a_{i1}F_1 + a_{i2}F_2 + \ldots + a_{im}F_m + d_iU_i \ . \tag{3-2}$$

The number of common factors, m, is usually much smaller than n, and these m factors account for the correlations among the original variables. The unique factor accounts for error and the remaining variance of the variable. In this model the F's are considered random variables and the correlations among the variables of a given sample

are treated as if they were the population correlations; that is, statistical variations are ignored and no assumptions are made, in the general case, about the statistical distributions of the original variables. Since the means and variances of the F's and U's are unknown in practice, they can be assumed to be zero and unity respectively with no loss of generality in the model; additionally, the n unique factors are supposed to be mutually independent and independent of the m common factors. The basic problem of factor analysis is to estimate the nm loadings of the common factors [2, Chap. 2].

1. Principal Factor Solution (U)

(U) Harmon states that the principal factor solution is probably the most widely used technique in factor analysis. The technique is adapted from the principal components solution to the factor analysis model (3-2), and is distinct from principal components in the amount of variance analysed. The communalities of the variables are placed on the diagonal of the correlation matrix to obtain a reduced matrix for principal factor analysis. Where, in the principal components model, the principal components can be expressed in terms of the observed variables, approximating procedures must be used in determining the principal factors.

(U) The sum of squares of factor coefficients gives the communality of a specified variable where one coefficient is representative of the contribution of that factor to the communality of the variable. The principal factor method selects successive ordered-factor coefficients so as to make the sum of the contributions of the ordered factors to the total communality a maximum. For the first factor this sum is given by

$$V_1 = a_{11}^2 + a_{21}^2 + \ldots + a_{n1}^2 , \tag{3-3}$$

with each a_{i1} chosen to maximize V under the constraint

$$(3\text{-}4) \qquad r_{ik} = \sum_{p=1}^{m} a_{ip}a_{kp} \qquad (i,k = 1, 2, \ldots, n),$$

where r_{ii} is the communality of variable i and $r_{jk} = r_{kj}$. The constraint conditions are the replacement of the observed correlations by the reproduced correlations which implies the assumption of zero residuals.

The solution technique for this constrained maximization problem proposed by Harmon [2] is the application of Lagrange multipliers, u_{ij}, which defines a new function T, such that

$$(3\text{-}5) \qquad 2T = V_1 - \sum_{j,k=1}^{n} u_{jk}r_{jk} = V_1 - \sum_{j,k=1}^{n} \sum_{p=1}^{m} u_{jk}a_{jp}a_{kp} .$$

The partial derivatives of the new function T with respect to any one of the n variables a_{j1} are set equal to zero, giving,

$$(3\text{-}6) \qquad \frac{\partial T}{\partial a_{jp}} = a_{j1} - \sum_{k=1}^{n} u_{jk}a_{kp} = 0$$

while the partial derivatives with respect to any of the other coefficients, a_{jp} $(p \neq 1)$ are set equal to zero, giving

$$(3\text{-}7) \qquad \frac{\partial T}{\partial a_{jp}} = - \sum_{k=1}^{n} u_{jk}a_{kp} = 0 \ , \ p \neq 1$$

These sets of equations are combined as follows:

$$(3\text{-}8) \qquad \frac{\partial T}{\partial a_{jp}} = \delta_{1p}a_{j1} - \sum_{k=1}^{n} u_{jk}a_{kp} = 0 \ , \ p = 1, 2, \ldots, m,$$

where the Kronecker Delta, $\delta_{1p} = 1$ if $p = 1$, and $\delta_{1p} = 0$ if $p \neq 1$.

If the combined equations are multiplied by a_{j1} and the summing operation completed with respect to j this gives

$$(3\text{-}9) \qquad \delta_{1p} \sum_{j=1}^{n} a_{j1}^2 - \sum_{j=1}^{n} \sum_{k=1}^{n} u_{jk}a_{j1}a_{kp} = 0.$$

From equation (3-6), $\sum_{j=1}^{n} u_{jk}a_{j1} = a_{k1}$, and if $\sum_{j=1}^{n} a_{j1}^2 = \lambda_1$,

then equation (3-9) can be written as

$$\text{(3-10)} \qquad \delta_{1p}\lambda_1 - \sum_{k=1}^{n} a_{k1}a_{kp} = 0.$$

If this equation is multiplied by a_{jp} and the summing operation completed with respect to p , the resulting equation is

$$\text{(3-11)} \qquad a_{j1}\lambda_1 - \sum_{k=1}^{n} a_{k1} \sum_{p=1}^{m} a_{jp}a_{kp} = 0.$$

When the constraining conditions in equation (3-4) are applied to this equation, the result is

$$\text{(3-12)} \qquad \sum_{k=1}^{n} r_{jk}a_{k1} - \lambda_1 a_{j1} = 0$$

which is a set of n equations, one equation for each value of j, the first of which can be written, in terms of communality ($r_{11} = h_1^2$) as

$$\text{(3-13)} \qquad (h_1^2 - \lambda)a_{11} + r_{12}a_{21} + \ldots + r_{1n}a_{n1} = 0.$$

Hadley [6] has shown that a necessary and sufficient condition for this type set of equations to have a nontrivial solution is the vanishing of the determinant of the coefficients of the unknowns, a_{j1}. The expansion of the determinant is an n^{th} order polynomial in λ. This polynomial, the characteristic equation of the set of equations, has a family of solutions, all of which are proportional to one solution, where the factor of proportionality is

$$\text{(3-14)} \qquad \lambda_1 = \sum_{j=1}^{n} a_{j1}^2 \quad .$$

However, this is the equation for V_1 , (equation (3-3)), the quantity to be maximized; that is, the maximizing solution to V_1 is the largest root, or eigenvalue, of the characteristic equation. To find the coefficients

of the first factor, F_1, which will account for the maximum amount of communality possible, the value of λ_1 is substituted into the set of equations of type (3-13) and a solution vector, eigenvector, $(\underline{\alpha})$ is obtained. To satisfy the conditions of equation (3-3),

$$(3\text{-}15) \qquad a_{j1} = \frac{\alpha_{j1}\sqrt{\lambda 1}}{\sqrt{\alpha_{11}^2 + \alpha_{21}^2 + \ldots + \alpha_{n1}^2}} \qquad (j = 1, 2, \ldots, n)$$

gives the coefficients for the first factor, F_1.

The resulting problem is to then find the coefficients for the factor, F_2, which will account for a maximum amount of the residual communality. The residual correlations after the first factor has been determined are given by

$$(3\text{-}16) \qquad r'_{jk} = r_{jk} - a_{j1}a_{k1} = a_{j2}a_{k2} + a_{j3}a_{k3} + \ldots + a_{jm}a_{km}$$

and the quantity to be maximized is

$$(3\text{-}17) \qquad V_2 = a_{12}^2 + a_{22}^2 + \ldots + a_{n2}^2,$$

subject to the constraint conditions in equation (3-16). Iteration of the Lagrange multiplier technique yields λ_2, the second largest eigenvalue of the solution to the equations of type (3-13) as the maximizing value of V_2. The factor coefficients are then determined in the same manner, using equation (3-15), as was used for the first factor. The procedure is applied simultaneously in practice to obtain all factor coefficients, each corresponding to successively decreasing values of the eigenvalues.

C. APPLICATION TO VIST DATA (U)

(U) The 27 variables [1] were retained from the analysis of the initial, 1592 reports, data set, and are defined in Appendix D. Bio-medical Computer Program (BIMED) 03M [4] was used for principal components analysis and BIMED X72 [5] was used for principal factor analysis. The computational procedures for these programs are described in Appendix E and Appendix F respectively.

(C) The two initial runs were made for comparison of the factor patterns from the expanded data set with those obtained by Gardner using the same factor analysis technique. The first run was for the total data set. In geographical area coverage as well as time period coverage, the initial data set was a subset of the expanded data base. The results of this comparison indicated a general agreement among the factor loadings with recording of the factors accomplished. The order of the 11 factors from the initial data corresponded to the following order of 10 factors from the expanded data:

1592 - 1 2 3 4 5 6 7 8 9 10 11

6264 - 2 1 3 4 5 9 6 8 7 No

The tenth factor from the expanded data loaded very high (VH) on variable 19, month of incident; there was no corresponding loading with the initial data. The initial data factor 10 loaded on Vietnamese/Pathet Lao which loaded high negative (H-) in the expanded data factor 5. The very high (VH) loading for Non-Communists for factor 11 from the initial data did not appear in the factor pattern from the expanded data.

(C) These results agreed with the anticipated result of only general correspondence between the first few factors which was expected because of the divergent area and time coverage.

(C) The second run compared 415 incident reports in Amphoe Chiang Khong, Changwat Chiang Rai, with 312 incident reports for the same area in the initial data. The resulting factors ordered as follows:

312 - 1 2 3 4 5 6 7 8 9 10

415 - 1 2 3 6 5 4 No 7 9 No

The expanded data analysis generated factors which could be interpreted as Police/Non-Communist Terrorists and Agent Reported in the seventh and tenth positions. These factors were not found in the initial factors. The Date/Time and Paramilitary factors in the initial analysis were not reproduced from the expanded data set. However, the factor patterns obtained from the same area with an increase in time period only were in closer agreement than the total data set factor patterns. The factor patterns obtained from the initial data are reproduced in Appendix G.

1. <u>Analysis of a Changwat</u> (U)

(C) Changwat Nakhon Phanom was selected for more detailed applications of the factor analysis techniques to the data base. Nakhon Phanom lies in northeast Thailand on the border with Laos. Orientation maps of the area are shown in Appendix H. The first instances of an active insurgency in Thailand were observed in Amphoe Na Kae and Nakhon Phanom has had the highest proportion of incident reports (2526/6264) of any changwat in Thailand. Nakhon Phanom consists of ten Amphoes which are very divergent in their size, ethnic populations, population densities, terrain, transportation and communication networks, and level of insurgency characteristics [8]. Incident reports ranged from 16 in the flat Amphoe Si Songkhram in the North to 1266 in the mountainous Amphoe Na Kae in the South.

[illegible]

(C) Principal factor analyses and principal components analyses were conducted on representative sizes of data sets from this area. The resulting factor matrices and the factor matrices for the total data set are contained in COMPUTER OUTPUT, PART 1. The areas are identified in Table II.

TABLE II (CONFIDENTIAL)

GEOGRAPHICAL AREAS FOR FACTOR ANALYSIS (U)

Area No.	Code	Geographical Name	Number of Incidents
1	2006	Amphoe Ban Phaeng	46
2	2001	Amphoe Muang	93
3	2008	King Amphoe Don Tan	140
4	2004	Amphoe That Phanom	196
5	2007	Amphoe Mukdahan	358
6	2005	Amphoe Na Kae	1266
7	20	Changwat Nakhon Phanom	2526
8	--	North and Northeast Thailand	6264

The first six areas were disjoint and independent, together they formed a subset of the seventh area, and the seventh a subset of the eighth. Study of the factor matrices indicated that as the number of incidents considered increased, the principal factor and principal component factor matrices tended to become more similar, that is, to generate the same factor loadings. This indication was examined in more detail by measuring the differences between corresponding elements of the factor matrices for each sample size, accounting for the bipolar nature of the factor loading vectors where necessary. The measures of difference considered were: the average difference in the corresponding elements, and the average sum of squared differences in the corresponding elements. The result of this analysis is shown in Table III.

TABLE III (UNCLASSIFIED)

CORRESPONDING ELEMENT COMPARISONS OF FACTOR MATRICES (U)

Sample Size	Average Difference	Sum of Squared Differences
46	0.0153366	0.0000020
93	0.0442839	0.0007640
140	0.0474198	0.0008715
196	0.0511202	0.0000864
358	0.0511445	0.0026657
1266	0.0380625	0.0001932
2526	0.0206374	0.0000000
6264	0.0028734	0.0000000

(U) Based on the results shown in Table III, it was concluded that, given the data base considered, the two procedures tend to generate the same factors with a sufficiently large sample size.

2. <u>Analysis of Generated Data</u> (U)

(U) In order to examine the conclusion that principal components analysis and principal factor analysis tend to generate the same factors using the same data with a sufficiently large sample size in a more general sense than using the VIST data set, two 4000-occurrence data sets were generated. For each occurrence, three independent standard normal observations were taken, y_1, y_2, y_3, and an arbitrary (4x3) coefficient matrix, $\underline{A}$, was applied to the $\underline{Y}$ vector to generate four normal random variables, x_1, x_2, x_3, x_4, which were not independent. In matrix terms:

(3-18) $\underline{X} = \underline{AY}^T$

Using the same $\underline{A}$ matrix and $\underline{Y}$ vector, four dichotomous, dependent, and discrete random variables, x_1', x_2', x_3', x_4', were generated by:

(3-19) $x_1' = 1,\ y_1a_{i1}+y_2a_{i2}+y_3a_{i3} > a_{i1}\mu_{y1}+a_{i2}\mu_{y2}+a_{i3}\mu_{y3}$

$= 0$, otherwise

$i = 1, 2, 3, 4$

The following notation was applied.

Let: $(f_{n\,ij})$ be a principal factor (n by m) factor matrix from normally distributed data,

$(f_{d\,ij})$ be a principal factor factor matrix from discrete data,

$(p_{n\,ij})$ be a principal component factor matrix from normally distributed data, and

$(p_{d\,ij})$ be a principal component factor matrix from discrete data.

The measures of difference between factor matrices were defined by

$$\text{(3-20)} \quad Mn = \frac{\sum_{i=1}^{n} \sum_{j=1}^{m} (f_{n\,ij} - p_{n\,ij})^2}{mn}$$

for normally distributed data, and

$$\text{(3-21)} \quad Md = \frac{\sum_{i=1}^{n} \sum_{j=1}^{m} (f_{d\,ij} - p_{d\,ij})^2}{mn}$$

for discrete data. The results shown in Table IV were obtained.

UNCLASSIFIED

TABLE IV (UNCLASSIFIED)

COMPARISON OF PRINCIPAL FACTOR AND PRINCIPAL COMPONENT

FACTOR ANALYSIS USING NORMALLY DISTRIBUTED AND DISCRETE DATA (U)

Sample Size	Mn x 10^{-4}	Md x 10^{-4}
30	2.567	13.595
60	35.281	17.764
100	20.828	15.467
200	18.294	6.454
600	21.886	4.067
1000	23.732	4.346
2000	21.462	3.332
4000	0.000	0.000

Based on the results, and qualified by the limitation of the amount of testing conducted, it was concluded that the analysis with generated data tended to support the results of the analysis of the VIST data, and without regard for the underlying distributions of the data.

(U) Further analysis was undertaken to examine the effects of increasing sample size, considering only the case of normally distributed data. It was observed that the computed correlation matrices, eigenvalues, and the cumulative proportion of total variance accounted for by each factor were identical (within the computational limitations of the computer) regardless of which factor analysis technique was applied, for a given sample size. This tended to confirm the conclusion, based on the theoretical presentation of the techniques, that the differences in the solutions were a result of the communalities computed by the principal factor method. It was also observed that the individual elements of the correlation matrices, the eigenvalues, and the cumulative propertions of total variances, each tended to converge toward a specific, but unknown, value with increasing sample size; as would be expected from the Law of Large Numbers. It was then noted that,

in the principal factor solution, the change in the value of a given factor loading for a variable was in the same direction, increasing or decreasing, as the change in the communality for that variable; and the magnitude of the change was generally proportional to the magnitude of the change in the communality. This led to an examination of the comparative stability of the factor loadings with respect to sample size under the principal factor and principal components solutions. The changes in communality are shown in Table V, changes in factor loadings for the principal factor solution factor one in Table VI, and the changes in the factor loadings for the principal components solution factor one in Table VII.

TABLE V (UNCLASSIFIED)

COMMUNALITIES VS INCREASING SAMPLE SIZE (U)

Sample Size	Variable 1	Variable 2	Variable 3	Variable 4
30	.789517	.929347	.962307	.972257
60	.744993	.876937	.908039	.917428
100	.762194	.897185	.929005	.938611
200	.762222	.897218	.929039	.938645
600	.758955	.893372	.925057	.934622
1000	.758638	.892999	.924670	.934231
2000	.760840	.895591	.927355	.936943
4000	.624458	.932500	.975567	.985781

TABLE VI (UNCLASSIFIED)

CHANGES IN FACTOR LOADINGS VS SAMPLE SIZE, PRINCIPAL FACTOR (U)

Sample Size	Variable 1	Variable 2	Variable 3	Variable 4
30-60	-.02542	-.02578	-.02806	-.02821
60-100	.00991	.01075	.01094	.01100
100-200	.00001	.00002	.00002	.00002
200-600	-.00187	-.00204	-.00207	-.00108
600-1000	-.00018	-.00019	-.00020	-.00020
1000-2000	.00126	.00237	.00139	.00140
2000-4000	-.08203	.01930	.02472	.02491

[illegible]

TABLE VII (UNCLASSIFIED)

CHANGES IN FACTOR LOADINGS VS SAMPLE SIZE, PRINCIPAL COMPONENTS (U)

Sample Size	Variable 1	Variable 2	Variable 3	Variable 4
30-60	-.10249	-.02048	-.00219	.00176
60-100	.03436	.01528	-.00009	-.00242
100-200	.00328	-.00515	.00047	.00201
200-600	-.00918	.00081	-.00037	-.00072
600-1000	.00039	-.00022	.00017	.00040
1000-2000	.00496	.00067	.00000	.00018
2000-4000	-.00146	.00004	-.00006	-.00015

The indication was that the factor loadings from the principal component solution tended to converge to some specific value in the same manner as the correlation matrix. Combining this indication with the apparent relationship between factor loadings and communalities from the principal factor solution, and the apparent tendency toward similar solutions from the two techniques with increasing sample size, the indication that the factor loadings from the principal factor solution tended to converge to some specific value as a function of the convergence of the correlation matrix and the communality, where the communality of a variable replaced its autocorrelation prior to the final iteration of the principal factor solution technique.

(U) There remained the question of why the two techniques, each with the same correlation matrix, produced different factor matrices at small sample sizes; and why the two techniques produced essentially the same factor matrices at large sample sizes, again each starting with the same correlation matrix. That is, what is the relationship between sample size and communality; the theoretical indications are that they are unrelated, but the empirical evidence supports convergence of the solutions at large sample sizes. A satisfactory answer to this question was not found.

IV. FORECASTING INSURGENT LEVELS OF ACTIVITY (U)

(U) The capability of completely and accurately anticipating or predicting an opponents course of action would be of inestimable value in any conflict situation. While complete and accurate prediction is an ultimate goal, it has rarely, if ever, been achieved in a military situation. In general, the military commander must use estimates of opposition capabilities which are based on a subjective evaluation of the degree of truth and accuracy of all the information which has been gathered concerning the opposition. The commander can then apply some type of subjective probability to the alternative courses of action within opposition capability in order to arrive at a decision for his own best course of action. The amount of probability the commander applies could be influenced by: personal experience and military judgement, the amount of available intelligence information, historical information, the results of war games or staff studies, or any of many other factors.

(U) Within the limited military intelligence experience of the author, mathematical forecasting techniques have not been used in an insurgency environment as one of the factors to influence the planning of counterinsurgency operations. The VIST data provided a base for examining some forecasting techniques and considering criteria for their potential usefulness in counterinsurgency planning.

A. FORECASTING TECHNIQUES (U)

(U) To be applicable for tactical use in a counterinsurgency environment, a forecasting technique should: be relatively simple in a mathematical sense, not requiring the use of sophisticated computer equipment or extensive hand computations; not require the maintenance of a large file of historical data; have flexibility in adjusting the rate of response; and, of course, be relatively accurate depending on the command level and the specific use intended for the forecasts.

(U) The above criteria led to the selection of three algebraic models and their associated smoothing techniques for forecasting total insurgent level of activity in a specified geographical area. Brown [9] provided the majority of the information for the following discussion.

1. <u>Constant Model</u> (U)

(U) This is the appropriate model where there is some reason to accept the hypothesis that the insurgency is relatively stable within the area and time span being considered. The number of incidents occuring within one time unit x_t, could then be represented by

$$x_t = \underline{a} + e_t \tag{4-1}$$

where the average value of the error term, e_t, is zero in all the techniques being considered. The basic problem in the model is to estimate the value of $\underline{a}$.

a. Moving Averages (U)

(U) The moving averages method provides a simple straightforward technique for estimating $\underline{a}$ which does not require extensive historical data. Considering the N most recent observations,

(4-2) $$M_t = \frac{x_t + x_{t-1} + \ldots + x_{t-N}}{N}$$

gives the average of these N observations and the current estimate for $\underline{a}$, the forecast for the number of incidents in the next time period. When the next observation, x_{t+1}, is received, the forecast error is given by

(4-3) $$E = M_t - x_{t+1}$$

and the new average is

(4-4) $$M_{t+1} = M_t + \frac{x_{t+1} - x_{t-N}}{N}$$

which remains the average of the N most recent observations.

(U) Moving averages provides an accurate estimate in that the average minimizes the sum of squares of the differences between the N most recent observations and the estimate of the next observation. The major disadvantage to moving averages is the flexibility in adjusting the rate of response. The rate of response is controlled by N, the larger of the value of N, the more stable the estimates and the more data which must be maintained on file. To have the capability of increasing the stability of the model, desirable if the level of insurgent activity was, in fact, constant, would require the additional maintenance of historical data no longer being used in the forecasting procedure. This disadvantage can be removed if x_{t-N} is estimated instead of being retained in a historical file. The best estimate for x_{t-N} is the average of all data, M_t, so the estimate of the next average becomes

(4-5) $$\hat{M}_{t+1} = M_t + \frac{x_{t+1} - M_t}{N} .$$

Since this is no longer a moving average but an estimate of an average, Brown changes the notation to S . If the estimation is repeated for successive observations, the resultant smoothed function is

(4-6) $$S_t = \alpha x_t + (1 - \alpha) S_{t-1}$$

and the process is called exponential smoothing.

b. Exponential Smoothing (U)

(U) The forecast for time t+1 by the method of exponential smoothing is the value of S_t computed in equation (4-6), and it is a linear combination of all previous observations such that the weight given to an observation decreases geometrically with the time since the observation was taken; the discrete equivalent to the exponential decay process. The smoothing constant, α , $(0 \leq \alpha \leq 1)$ determines the proportion of weight which will be placed on the latest observation, and therefore, the response rate of the technique. The response is similar to moving averages with α considered like 1/N. The technique achieves accuracy in that it minimizes the weighted sum of the residuals.

2. Linear Model (U)

(U) The indication of a constant changing rate in the level of observations can be incorporated into the forecasts by the use of a linear model where

(4-7) $$x_t = \underline{a} + \underline{b}t + e_t$$

represents an observed value and estimates for two coefficients are required for forecasting. The moving averages technique is extended to provide a least squares fit to the data using the N most recent observations. The analogous double smoothing procedure can then be defined by a double smoothed value, $S2_t$, of the observations through time t which is given by

(4-8) $S2_t = \alpha S_t + (1 - \alpha) S_{t-1}$,

and the coefficients are estimated by

(4-9) $\underline{\hat{a}}_t = 2S_t - S2_t$

and

(4-10) $\underline{\hat{b}}_t = \alpha/1 - \alpha (S_t - S2_t)$.

Applying these coefficients to the model, the forecast for the next time period is given by

(4-11) $\hat{x}_{t+1} = 2S_t - S2_t + \alpha/1 - \alpha \ (S_t - S2_t)$.

The forecast error is given by

(4-12) $E = \hat{x}_{t+1} - x_{t+1}$.

Double smoothing requires two elements of historical data and retains the flexibility of response reate dependent on the selection of a value for the smoothing constant. Linear trends in the level of insurgent activity are accounted for with only a moderate increase in computational effort.

3. Quadratic Model (U)

(U) The use of higher order polynomials was demonstrated by the quadratic model and the triple exponential smoothing technique where an observed value is represented as

(4-13) $x_t = \underline{a} + \underline{b}t + 1/2\underline{c}t^2 + e_t$

which incorporates the indication of a change in the rate of increase or decrease of incident activity. Subjectively this might be described as an acceleration of the insurgency. Since three coefficients must be estimated for forecasting, a triple smoothed value, $S3_t$, of the observations is defined as

(4-14) $S3_t = \alpha S2_t + (1 - \alpha) S3_{t-1}$,

and the coefficients can be estimated by

(4-15) $\underline{\hat{a}}_t = 3S_t - 3S2_t + S3_t$

(4-16) $\underline{\hat{b}}_t = (\alpha/2(1 - \alpha)^2)\ ((6 - 5\alpha)S_t - 2(5 - 4\alpha)S2_t +$

$(4 - 3\alpha)S3_t)$

(4-17) $\underline{\hat{c}}_t = (\alpha^2/2(1 - \alpha))(S_t - 2S2_t + S3_t)$.

Combining the coefficients into the model gives the ofrecasting relationship for the next time period as

(4-18) $$\hat{x}_{t+1} = \frac{(2 - 3\alpha + \alpha^2)S_t - (6 - 2\alpha)S2_t + 2S3_t}{2 - 4\alpha + 2\alpha^2} .$$

Three elements of historical data must be retained but, otherwise, the technique retains the basic characteristics of the lower ordered models. The computations are more extensive, however the coefficients for the smoothed values in the forecasting equation (4-18) are constant with any specified value for the smoothing constant.

B. APPLICATION TO VIST DATA (U)

(C) Smoothing techniques for the constant, linear, and quadratic models were applied to Changwat Nakhon Phanom and five Amphoes in Nakhon Phanom. The areas were selected based on the number of incidents reported in the data base and the apparent degree of stability of the insurgency in the area in order to attempt a representative sample for comparative purposes. The areas are defined in Table VIII.

TABLE VIII (CONFIDENTIAL)

IDENTIFICATION OF GEOGRAPHIC AREAS (U)

Area Number	Geographical Area	Number of Incidents	Number of Violent Incidents
1	Amphoe Ban Phaeng	46	3
2	Amphoe Muang	93	7
3	Amphoe Kam Cha I	200	23
4	Amphoe Mukdahan	355	78
5	Amphoe Na Kae	1266	287
6	Changwat Nakhon Phanom	2551	512

(C) The first nine months (January - September 1967) of total incident data were taken to establish the initial values, S_t, $S2_t$, and $S3_t$ for the smoothing techniques. The initial values were computed by least squares (moving averages) with N = 3 months. A constant lead time of one month was used throughout the computations and smoothing constants of: .10, .30, .50, .70, and .90 were applied to each technique for each area. The FORTRAN IV program for the forecasting is listed in the COMPUTER PROGRAM section.

1. Results (U)

(C) The results of the application of forecasting techniques are in COMPUTER OUTPUT, PART 2. Five criteria were considered as having the potential for being useful indicators of the accuracy of forecasting over time, depending on the projected use of the forecasts. These were:

a. The average forecasting error, defined by

$$\frac{\sum_{i=10}^{33} (x_i - \hat{x}_i)}{24}.$$

b. The average percentage forecasting error, defined by

$$\frac{\sum_{i=10}^{33} (x_i - \hat{x}_i)/x_i}{24} \cdot 100$$

where $x_i \neq 0$.

c. The average absolute value of the forecasting error per incident, defined by

$$\frac{\sum_{i=10}^{33} |x_i - \hat{x}_i|}{\sum_{i=10}^{33} x_i} .$$

d. The average sum of squared forecasting errors, defined by

$$\frac{\sum_{i=10}^{33} (x_i - \hat{x}_i)^2}{24} .$$

e. The value of the maximum forecast error, defined by

$$\max\ [(x_{10} - \hat{x}_{10}), (x_{11} - \hat{x}_{11}), \ldots, (x_{33} - \hat{x}_{33})].$$

No attempt was made to apply these criteria to longer range forecasts than one month, nor to evaluate if the techniques were accurate in any absolute sense. One of the criteria for relative accuracy was considered, the average sum of squared forecasting errors, and observations were made as shown in Table IX concerning accuracy and normalized absolute forecasting error per incident compared to variations in the value of the smoothing constant.

[illegible]

TABLE IX (CONFIDENTIAL)

RELATIVE ACCURACY OF FORECASTING RESULTS (U)

Area Number	Overall Best Technique	Effect of Smoothing Constant
1	Constant Model $\alpha = .3$ $\lvert$Error$\rvert$/incident = .75	Quadratic Model best at $\alpha = .1$, otherwise Constant Model best
2	Constant Model $\alpha = .3$ $\lvert$Error$\rvert$/incident = .86	Constant Model best throughout
3	Constant Model $\alpha = .3$ $\lvert$Error$\rvert$/incident = .63	Linear Model best at $\alpha = .1$, otherwise Constant Model best
4	Constant Model $\alpha = .7$ $\lvert$Error$\rvert$/incident = .54	Quadratic Model best at $\alpha = .1$, otherwise Constant Model best
5	Linear Model $\alpha = .1$ $\lvert$Error$\rvert$/incident = .39	Linear Model best at $\alpha = .1$, otherwise Constant Model best
6	Constant Model $\alpha = .1$ $\lvert$Error$\rvert$/incident = .24	Constant Model best throughout

V. CONCLUSIONS AND RECOMMENDATIONS (U)

(C) It was the purpose of this thesis to continue the analysis of data collected during the early stages of a developing insurgency. This was accomplished, and conclusions and recommendations were presented as each phase of the analysis was examined. There were some conclusions, however, which were not specific to the general survey of the data or an analysis technique. There were weaknesses in the data; the absence of information concerning the government forces and operations seemed to be the greatest obstacle to using the data in a meaningful way to assist in planning, conducting, or evaluating counterinsurgency operations -- no matter what analysis techniques were applied to the data. The seriousness of this problem seemed apparent here; it was impossible to judge, however, what the effect of not having this data has been on analyses conducted in Thailand.

(C) Given that there were weaknesses in the data, there remained the fact that it was, and may continue to be for some time, the largest and most complete set of computer retrievable information concerning the activities of Communist insurgents in the early states of an insurgency, and the likelihood of United States military forces being involved in counterinsurgency operations in the future does not appear to be decreasing. This in itself was sufficient justification for analysis and recommendations which might improve the data.

(C) The limitation on time precluded deeper exploration into the analysis techniques which were applied to the data, and constrained the number of techniques which could be attempted. The reduction of the size of a data set without loss of significant information is a valuable element in determining the extent to which the data will be used. The operational use of factor scores as new incidents are reported, plus periodic updating of the factor solution, would provide a near real-time association between present and past insurgent activity -- given that the validity of the factors and their interpretations were generally accepted within the using community. Forecasting insurgent activity was considered important and additional analysis with respect to the models applied and the possibility of sorting types of incidents into subsets with different characteristics would seem to have the potential of improving the accuracy of the predictions, and accuracy of results would insure expanded usage. The final conclusion, as to the value of the recommendations for changing the VIST reporting systems which were made in this thesis, can only be reached if the recommendations are implemented and the reporting system reevaluated at a later date.

APPENDIX A

VIST DATA FORMAT

Column	Element of Information
1-2	Changwat Code
3-4	Amphoe Code
5-6	Tambon Code
7-8	Muban Code
9-16	UTM Coordinates of Incident
17-18	Incident Code
19-24	Reporter of Incident
19	Royal Thai Army (RTA)
20	Civilian
21	Police
22	Paramilitary
23	Source
24	Unknown
25-29	Initiator of Incident
25	RTA
26	Police
27	Paramilitary
28	Communist Terrorist
29	Unknown

30-34	Target of Incident
30	RTA
31	Civilians
32	Police
33	Paramilitary
34	Questionable
35-36	Day of Month of Incident
37-38	Month
39-40	Year
41-48	Infiltration UTM Coordinates
49-56	UTM Coordinates From
57-64	UTM Coordinates To
65	Armed or Uniformed
66	Pathet Lao Involved
67	Tribes Involved
68	Vietnamese Involved
69	Other Ethnic Involved
70-72	Number of Communist Terrorists
73-75	Number of Non-Communist Terrorists
76-78	(Blank)
78-80	Hour of Day

APPENDIX B

GEOGRAPHICAL CODES

Code	Changwat	Code	Amphoe	Code	Tambon
12	Chiang Rai	03	Chiang Khong	01	Wiang
				02	Khrung
				03	Bun Ruang
				04	Po
				05	Muang Yai
				06	Sathan
				07	Huai So
		04	Chiang Kham	01	Yuan
				02	Chedi Dam
				03	Chiang Raeng
				04	Nam Waen
				05	Fai Kwang
				06	Wiang
				07	Sop Bong
		05	Chiang Saen	01	Wiang
				02	Ban Saeng
				03	Pa Sak
		07	Thoeng	01	Wiang Thoeng
				02	Ngao
				03	Ngiu
				04	Chiang Khian
				05	Ta
				06	Tap Tao

Code	Changwat	Code	Amphoe	Code	Tambon
12	Chiang Rai (Cont.)	07	Thoeng (Cont.)	07	Plong
				08	Pa Tan
				09	Mae Loi
				10	Yang Hom
				11	Mae Pao
		08	Pong	01	Pong
				02	Khuan
				03	Ngim
				04	Chiang Muan
				05	Pha Chong Noi
				06	Yot
				07	Sa
				08	Oi
20	Nakhon Phanom	01	Muang	61	Nai Muang
				62	Nong Saeng
				04	Kurukhu
				05	Kham Thao
				06	Dong Khwang
				07	Kham Toei
				08	Tha Kho
				09	Na Sai
				10	Na Rat Khwai
				11	Nong Yat
				13	Ban Klang
				15	At Samat
				16	Ban Phung

Code	Changwat	Code	Amphoe	Code	Tambon
20	Nahkon Phanom (Cont.)	02	Kham Cha 1	01	Ban Song
				02	Kham Cha 1
				03	Nong Sung
				04	Nong Sung Tai
				05	Nong Ian
				06	Ban Kho
				07	Ban Lao
		03	Tha Uthen	01	Tha Uthen
				02	Chai Buri
				03	Tha Champa
				04	Na Khamin
				05	Ban Kho
				06	Pathai
				07	Phanom
				08	Phon Sawan
				09	Ram Rat
				10	Non Tan
		04	That Phanom	01	That Phanom
				02	Don Nang Hong
				03	Tha Lat
				04	Na Thon
				05	Nam Kam
				06	Fang Daeng
				07	Phra Klang Thung
				08	Phon Thong

Code	Changwat	Code	Amphoe	Code	Tambon
20	Nahkon Phanom (Cont.)	04	That Phanom (Cont.)	09	Renu
				10	Saen Phan
		05	Na Kae	01	Na Kae
				02	Kok Tum
				03	Kan Luang
				04	Dong Luang
				05	Na Khu
				06	Nong Bo
				07	Nong Bua
				08	Nong Sang
				09	Phra Song
				10	Phi Man
				11	Phum Kae
		06	Ban Phaeng	01	Ban Phaeng
				02	Na Thom
				03	Nong Waeng
		07	Mukdahan	01	Mukdahan
				02	Dong Yen
				03	Na Kok
				04	Na Sok
				05	Ban Khok
				06	Phung Daet
				07	Phon Sai
				08	Wan Yai
				09	Si Bun Ruang

Code	Changwat	Code	Amphoe	Code	Tambon
20	Nahkon Phanom (Cont.)	07	Mukdahan (Cont.)	10	Bang Sai Yai
				11	Kham A Huan
				12	Kham Pa Lai
				13	Nikham Kham Soi
				14	Na Udom
		08	Don Tan (K.A.)	01	Don Tan
				02	Pho Sai
				03	Pa Rai
				04	Ban Bak
				05	Lao Mi
		09	Si Songkhram	01	Si Songkhram
				02	Tha Bo Songkhram
				03	Na Dua
				04	Na Wa
				05	Ban Sieo
				06	Ban Uang
				07	Sam Phong
				08	Na Ngua
		10	Pla Pak (K.A.)	01	Pla Pak
				02	Kut Ta Kai
				03	Khok Sawang
				04	Na Makhua
				05	Maha Chai
				06	Nong Hi

Code	Changwat	Code	Amphoe	Code	Tambon
26	Nan	01	Muang	02	Kong Khwai
				03	Chaiya Sathan
				04	Du Thai
				05	Du Phong
				06	Thum Tong
				07	Tha Nao
				08	Na Sao
				09	Na Pang
				10	Nong Daeng
				11	Nam Kaen
				12	Bo
				13	Pha Sing
				14	Fai Kaeo
				15	Phong
				16	Mo Muang
				17	Muang Tit
				18	Muang Chang
				19	Ruang
				20	Suak
				21	Suat
				60	Nai Wiang
		02	Thung Chang	01	Lae
				02	Ngop
				07	Pon

Code	Changwat	Code	Amphoe	Code	Tambon
26	Nan (Cont.)	03	Na Noi	01	Na Noi
				02	Chiang Khong
				03	Na Thanung
				04	Bo Kaeo
				05	Muang Li
				06	Sisaket
				07	Sathan
				08	Santha
		04	Pua	01	Pua
				02	Ngaeng
				03	Bo Klua Tai
				04	Bo Klua Nua
				06	Sila Phet
				07	Sila Laeng
				08	Sathan
				09	Uan
		05	Tha Wang Pha	01	Rim
				02	Tan Chum
				03	Pa Kha
				04	Yam
				05	Pha To
		06	Sa	01	Klang Wiang
				02	Khung
				03	Tan Chum
				04	Na Luang
				05	Nam Pua

Code	Changwat	Code	Amphoe	Code	Tambon
26	Nan (Cont.)	06	Sa (Cont.)	06	Nam Muap
				07	Pong Sanuk
				08	Yam Hua Nam
				09	Lai Nam
				10	Wai Na Lai
				11	San
		07	Chiang Klang (K.A.)	01	Chiang Klang
				02	Chiang Khan
				03	Na Lai Luang
				04	Bua
37	Phitsanulok	02	Nakhon Thai	01	Nakhon Thai
				02	Chat Trakan
				03	Nakhon Chum
				04	Na Bua
				05	Noen Phoem
				06	Nong Kathao
				07	Pa Daeng
52	Loei	02	Chiang Khan	01	Chiang Khan
				02	Khao Khaeo
				03	That
				04	Na Sao
				05	Bu Ham
				07	Pak Tom
		03	Dan Sai	01	Dan Sai
				02	Kok Sathon
				03	Na Di

Code	Changwat	Code	Amphoe	Code	Tambon
52	Loei (Cont.)	03	Dan Sai (Cont.)	04	Na Phung
				05	Na Haeo
				06	Nong Bua
				07	Ban Pong
				08	Pla Ba
				09	Phon Sung
				10	Wang Yao
				11	I Pum
		04	Tha Li	01	Tha Li
				02	Nong Phu
				03	Lat Khang
				04	A Hi
		07	Pak Chom	01	Pak Chom
				02	Chiang Klom
				03	Hat Khamphi
66	Nong Khai	01	Muang	61	Nai Muang
				02	Kuan Wan
				03	Khai Bok Wan
				04	Ban Fang
				05	Ban Dua
				06	Phra That Bang Phuan
				07	Mi Chai
				08	Wiang Khuk
				09	Wat That
				10	Sa Khrai
				11	Hin Ngom

Code	Changwat	Code	Amphoe	Code	Tambon
66	Nong Khai (Cont.)	02	Seka	01	Seka
				02	Sang
				03	Dong Bang
				04	Tha Kok Daeng
				05	Pho Mak Khaeng
				06	Ban Tong
		03	Tha Bo	01	Tha Bo
				02	Kong Nang
				03	Khok Khon
				04	Nam Mong
				05	Ban Dua
				06	Ban Thon
		04	Bung Kan	01	Bung Kan
				02	Khok Kong
				03	Chomphu Phon
				04	Nang Kheng
				05	Nong Doen
				06	Don Ya Nang
				07	Non Sombun
				08	Si Chomphu
		05	Phon Phisai	01	Chum Phon
				02	Kut Bong
				03	Chum Chang
				04	So
				05	Soem

Code	Changwat	Code	Amphoe	Code	Tambon
66	Nong Khai (Cont.)	05	Phon Phisai (Cont.)	06	Thung Luang
				07	Pak Khat
				08	Phon Phaeng
				09	Rattanawapi
				10	Wat Luang
				11	Si Chomphu
				12	Nong Phan Tha
				13	Na Nang
				14	Lao Tang Kham
		06	Si Chiangmai	01	Phan Phrao
				02	Ban Mo
				03	Pho Tak
				04	Nong Pla Pak
		07	Sangkham (K.A.)	01	Kaeng Kai
				02	Ban Muang
69	Uttaradit	04	Nam Pat	01	Saen To
				02	Den Lek
				03	Nam Khrai
				04	Nam Phai
				05	Ban Fai
		06	Fak Tha	01	Fak Tha
				02	Ban Khok
				03	Ban Sieo
				04	Muang Chet Ton
				05	Song Khon

Code	Changwat	Code	Amphoe	Code	Tambon
71	Ubon	03	Khemmarat	01	Khemmarat
				02	Kham Pom
				03	Chiat
				04	Na Tan
				05	Na Waeng
				06	Nong Phu
				07	Phalan
				08	Pho Sai
				09	Muang Yai
				10	Samrong
		05	Khong Chiam	01	Na Kham
				02	Kaeng Kok
				03	Kham Lai
				04	Nam Thaeng
				05	Lat Khwai
				06	Warin
				07	Song Yang
				08	Uat Yai
		07	Chanuman	01	Chanuman
				02	Khok Kong
				03	Kham Khuan Kaeo
				04	Nong Kha
		10	Ban Dan	01	Khong Chiam
				02	Nong Saeng Yai
				03	Na Pho Klang
				04	Huai Yang

Code	Changwat	Code	Amphoe	Code	Tambon
71	Ubon (Cont.)	11	Buntharik	01	Phon Ngam
				02	Kho Laen
				03	Huai Kha
		13	Phibun Mangsahan	02	Kui Chomphu
				03	Chik Toeng
				04	Don Chik
				05	Tan Sum
				06	Sai Mun
				07	Na Pho
				08	Non Klang
				09	Nong Bua Hi
				10	Pho Si
				11	Pho Sai
				12	Rawe
				13	Rai Tai
				14	Samrong
				15	Ang Sila
				16	Fang Kham
				71	Phibun Mangsahan

UNCLASSIFIED

APPENDIX C

INCIDENT CODES AND DEFINITIONS

01 - Attack	An action in which the CT use both gunfire and maneuver in an attempt to seize an objective.
02 - Firefight	An action in which the CT use gunfire alone in an attempt to inflict casualties and/or property damage.
03 - Ambush	A surprise attack usually conducted from planned positions, against a moving or temporarily halted troop, unit, or convoy.
04 - Harassment	An action in which the primary objective of the CT is to temporarily disrupt the activities of a unit, installation, village or activity rather than to inflict serious casualties or damage. Examples are burning of crops, sniping at a patrol, harassing gunfire, booby traps, and mining incidents of a minor nature.
05 - Terrorism	An action directed against civilians or military personnel not engaged in military duties in which the primary objective is to intimidate. This includes assassinations, kidnappings, mining or bombing of public buildings.

06 - Sabotage	Normally a covert action, and causing damage or destruction to essential facilities or property so that vital public services, communications, or transportation are put out of commission.
07 - Armed Propaganda	An effort by armed CT groups to indoctrinate civilians in order to produce a favorable or neutral attitude toward the CT, or to implant doubt about RTG concern for or ability to protect its citizens.
08 - Anti-Aircraft Fire	Gunfire from the ground directed at aircraft in flight.
09 - Clash	An armed encounter between RTG forces and the CT, usually as the result of RTG patrol or sweep activities.
10 - Armed Procurement	CT procurement of supplies by means of force.
19 - Other (Violent)	Any type in the narrative.
20 - Organization	Leadership, internal structure, designations.
21 - Meetings	Meeting of CT groups for known or unknown purposes.
22 - Recruitment	Methods, membership requirements, admission procedures, recruitment per se.
23 - Strength	Of CT groups.

24 - Defections	Of CT members.
25 - Sightings	Of individuals or groups of CT.
26 - Training Outside Country	Of personnel to be used in Thailand.
27 - Training in Country	Doctrine, Tactics, Subversion.
28 - CT Camp/Base	Location and/or description.
29 - Deployment	Order of battle.
30 - Finances	Contribution, Extortion, Taxation.
31 - Logistics	Supply Methods, Sources Routes, Material, Suppliers.
32 - Communications	Methods and routing including couriers.
33 - Arms Cache	Stockpiles of weapons.
34 - Arms Smuggling	
36 - Infiltration	Personnel augmentation from outside country.
37 - Espionage	Includes CT asking about RTG forces.
38 - Counterfeiting	
39 - Propaganda (non-armed)	Leaflets, broadcasts, word of mouth, themes.
40 - Captured CT Documents	
41 - Captured CT Material	
42 - Arrests, Capture	Of CT suspects.
43 - Release	Of CT suspects.
44 - Helicopter Sighting	
45 - Helicopter Landing	
50 - CT Plans	Proposed future actions of a violent nature.
99 - Other (Nonviolent)	Include suspect CT.

APPENDIX D

VARIABLES USED IN ANALYSIS

1	Incident Code
2	RTA Reported
3	Civilian Reported
4	Police Reported
5	Paramilitary Reported
6	Source Reported
7	Unknown Reporter
8	RTA Initiated
9	Police Initiated
10	Paramilitary Initiated
11	Communist Terrorist Initiated
12	Unknown Initiator
13	RTA Target
14	Civilian Target
15	Police Target
16	Paramilitary Target
17	Questionable Target
18	Day of Month
19	Month
20	Armed or Uniformed
21	Pathet Lao Involved
22	Tribes Involved
23	Vietnamese Involved

24	Other Ethnic Groups Involved
25	Number of Communist Terrorists
26	Number of Non-Communist Terrorists
27	Hour of Day

APPENDIX E

COMPUTATIONAL PROCEDURE, BIMED 03M

Step 1. The data re in the form x_{ij}, (i = 1,2, ..., n, cases), (j = 1, 2, ...,p, variables). The means are computed by

$$\overline{X}_j = \sum_{i=1}^{n} X_{ij}/n$$

the standard deviations

$$s_j = \sqrt{\frac{\sum_{i=1}^{n} (X_{ij} - \overline{X}_j)^2}{n-1}}$$

and the correlation coefficients

$$r_{ij} = \frac{\sum_{\alpha=1}^{n} (X_{\alpha i} - \overline{X}_i)\ (X_{\alpha j} - \overline{X}_j)}{\sqrt{\sum_{\alpha=1}^{n} (X_{\alpha i} - \overline{X}_i)^2 \sum_{\alpha=1}^{n} (X_{\alpha j} - \overline{X}_j)^2}}$$

Step 2. The diagonal elements of the correlation matrix are adjusted to unity.

Step 3. The p eigenvalues and p eigenvectors of the adjusted correlation matrix, R, are obtained, solving the system

$$RV = V\lambda,\ V^TV = I$$

where λ_j is the j^{th} eigenvalue, and $\beta_j = (v_{1j}, v_{2j}, \ldots, v_{pj})$ is the j^{th} eigenvector.

Step 4. The program determines the number of factors to be rotated, q , by the formula

$$q = \min(k, m)$$

where k is the number of eigenvalues greater than c (an input to the program, c = 1.0), and m is a specified number of factors (input m = 13).

Step 5. The coefficients of each factor are obtained by

$$a_{ij} = \sqrt{\lambda_j}\, v_{ij} \qquad \begin{array}{l} i = 1, 2, \ldots, p \\ j = 1, 2, \ldots, q \end{array}$$

and the p x q factor matrix, $A = (a_{ij})$ is printed.

Step 6. A factor check matrix is computed, given that $p \neq q$, by

$$C = A^T \cdot A$$

where C is a p x q matrix containing the eigenvalues on the diagonal.

Step 7. Orthogonal rotations are performed on the factor matrix to maximize

$$V = \sum_j [p\sum_i (a_{ij}^2/h_i^2 - (\sum_i (a_{ij}^2/h_i^2))^2]$$

where i = 1, ..., p are variables; j = 1, ..., q are factors; and h_i^2 is the communality of the i^{th} variable defined by

$$h_i^2 = \sum_j a_{ij}^2 \quad .$$

Step 8. The normalized factor matrix is computed by

$$b_{ij} = \frac{a_{ij}}{\sqrt{h_i^2}}$$

Step 9. A computational loop is started through Step 12 until the convergence test is passed in Step 9 and the program transfers to Step 13. The variance is computed, factors by

$$s_j = [p\sum_i (b_{ij}^2)^2 - (\sum_i b_{ij}^2)^2]/p^2$$

and the matrix

$$V_c = \sum_i s_j \qquad c = 1, 2, \ldots$$

and if $|V_c - V_{c-1}| < 10^7$ four successive times, the program transfers to Step 13.

Step 10. The maximization criterion is done for two factors at a time. If x and y are column vectors of normalized coefficients (factor loadings), then, treating them as constants,

$$(x, y) \times \begin{bmatrix} \mathrm{Cos}\ \phi & -\mathrm{Sin}\ \phi \\ \mathrm{Sin}\ \phi & \mathrm{Cos}\ \phi \end{bmatrix} = (X, Y)$$

where X and Y, the desired normalized loadings, are functions of ϕ, the angle of rotation. Necessary conditions for a maximum are:

$$A = \Sigma\ (x_i + y_i)(x_i - y_i)$$

$$B = 2\ \Sigma\ x_i y_i$$

$$C = \Sigma\ [(x_i + y_i)(x_i - y_i) + 2x_i y_i]\ [(x_i + y_i)$$
$$(x_i - y_i) = 2x_i y_i]$$

$$D = 4\ \Sigma\ (x_i + y_i)(x_i - y_i)\ x_i\ y_i$$

$$NUM = D - 2\ A\ B/p$$

$$DEN = C - (A + B)(A - B)\ /p$$

$$\phi' = 1/4\ \mathrm{ARCTAN}(NUM/DEN)$$

If $\phi' \leq 1/4$ degree the program goes to Step 12; otherwise, to Step 11.

Step 11. If DEN is positive, the program computes:

$$|\mathrm{Cos}\ \phi| = \mathrm{Cos}\ \phi'$$

$$|\mathrm{Sin}\ \phi| = \mathrm{Sin}\ \phi'$$

otherwise, it computes:

$$|\mathrm{Cos}\ \phi| = (\sqrt{2}/2)(\mathrm{Cos}\ \phi' + \mathrm{Sin}\ \phi')$$

$$|\mathrm{Sin}\ \phi| = (\sqrt{2}/2)(\mathrm{Cos}\ \phi' + \mathrm{Sin}\ \phi')$$

and if NUM is positive, the program computes:

$$\text{Cos } \phi = |\text{Cos } \phi|$$

$$\text{Sin } \phi = |\text{Sin } \phi|$$

otherwise, it computes:

$$\text{Cos } \phi = \quad |\text{Cos } \phi|$$

$$\text{Sin } \phi = -\ |\text{Sin } \phi|$$

and goes to Step 12.

Step 12. One iteration cycle is completed when all pairwise single-plane rotations (Steps 10 and 11) are made on the normalized factors; the program then goes to Step 9.

Step 13. The final rotated normalized factors are unnormalized by

$$a_{ij} = b_{ij}h_i$$

and the rotated unnormalized factor matrix, A, is printed. Final communalities and the difference from initial communalities are computed and printed, and the original and successive variance are printed.

APPENDIX F

COMPUTATIONAL PROCEDURE, BIMED X72

Step 1. The data are in the form X_{ij}, (i = 1, 2, ..., n, cases), (j = 1, 2, ..., p, variables). The data are read casewise and the method of provisional means is used to compute cross products recursively by

$$\bar{x}_i^{(k+1)} = \bar{x}_i^{(k)} + D_i$$

$$S_{ij}^{(k+1)} = S_{ij}^{(k)} + k(k+1)D_iD_j$$

$$D_i = (x_{k+1,i} - \bar{x}_i^{(k)})/(k+1).$$

The means, convariances, standard deviations, and correlations are given by

$$\bar{x}_i = \bar{x}_i^{(n)},$$

$$s_{ij} = S_{ij}^{(n)}/n,$$

$$s_i = (s_{ii})^{1/2},$$

and

$$r_{ij} = s_{ij}/s_is_j .$$

Step 2. As required for initial communality estimates, the diagonal of the matrix (r_{ij}) is left unaltered.

Step 3. The matrix (r_{ij}) is tri-diagonalized by the method of Householder, its eigenvalues obtained by means of Sturm sequences, and its eigenvectors found by the method of Wilkinson. All of the eigenvalues

$\lambda_1, \lambda_2, \ldots, \lambda_n$ are obtained, the number r of eigenvectors $v_1, v_2, \ldots, v_r$ is equal to the min ($\underline{a}$, and max(i: $\lambda_i > \underline{c}$)) where $\underline{a}$ is the specified number of factors (input $\underline{a}$ = 13) and $\underline{c}$ is the specified minimum eigenvalue (input $\underline{c}$ = 1.0). The j^{th} column of the factor loading matrix (k_{ij}) is $\sqrt{\lambda_i} v_j$. New communality estimates are given by

$$h_i^2 = \sum_j k_{ij}^2 \quad .$$

If more than one iteration for communalities is required, the diagonal of (r_{ij}) is replaced by the new estimates and this step is repeated from the beginning. Iteration is continued until a specified maximum number of iterations or until the maximum change in the communality estimates h_i^2 is less than .001. Initial and final communality estimates are printed together with the final factor loadings.

Step 4. Kaiser normalizations are applied to the loadings by

$$k'_{ij} = k_{ij}/h_i \; ,$$

and rotations are performed to minimize the criterion

$$G((k_{ij})) = \sum_{a \neq b} \left(\sum_{i=1}^{p} k_{ia}^2 k_{ib}^2 - \frac{1}{p} \left(\sum_{i=1}^{p} k_{ia}^2 \right) \left(\sum_{i=1}^{p} k_{ib}^2 \right) \right)$$

where 1/p specified an orthogonal varimax rotation. Rotations are made by pairwise modifications of columns of (k_{ij}) through all pairs. Complete cycles are continued until the change in G relative to its initial value is less than 10^{-5}. The Kaiser normalizations are corrected for by the inverse relation

$$k'_{ij} = k_{ij} h_i$$

and the final values of k_{ij} are the primary factor loadings.

APPENDIX G

INITIAL DATA FACTOR PATTERNS (U)

Total Data Factor Names and Numbers

No.	Variables Name	RTA 1	CT-Violent 2	Paramilitary 3	Police 4	Tribes 5	Known Reporter 6	Unknowns 7	Date/Time 8	Agent Reported 9	Viet/Pathet Lao 10	Non-CT 11
1	Incident Code	M-	H-			L						
2	RTA Reported	VH								L-		
3	Civilian Reported			L-	L-		VH-					
4	Police Reported				VH							
5	Paramilitary Reported			VH								
6	Source Reported									VH		
7	Unknown Reporter	L-					VH			L-		
8	RTA Initiated	VH				L-						
9	Police Initiated				VH							L
10	Paramilitary Initiated			VH								
11	CT Initiated		VH									
12	Unknown Initiator							VH-				
13	RTA Target	VH										
14	Civilian Target	L-	VH									
15	Police Target				VH							

No.	Name	RTA 1	CT-Violent 2	Paramilitary 3	Police 4	Tribes 5	Known Reporter 6	Unknowns 7	Date/Time 8	Agent Reported 9	Viet/Pathet Lao 10	Non-CT 11
16	Paramilitary Target			VH								
17	Unknown Target							VH-				
18	Day								H		L	
19	Month								L	M		
20	Arms or Uniforms					VH-						
21	Pathet Lao					L-					H	
22	Tribesmen					M-			M-			
23	Vietnamese										VH	
24	Other Ethnic Groups					VH						
25	Number of CT								H-		L	
26	Number of Non-CT										VH	
27	Hour								H			

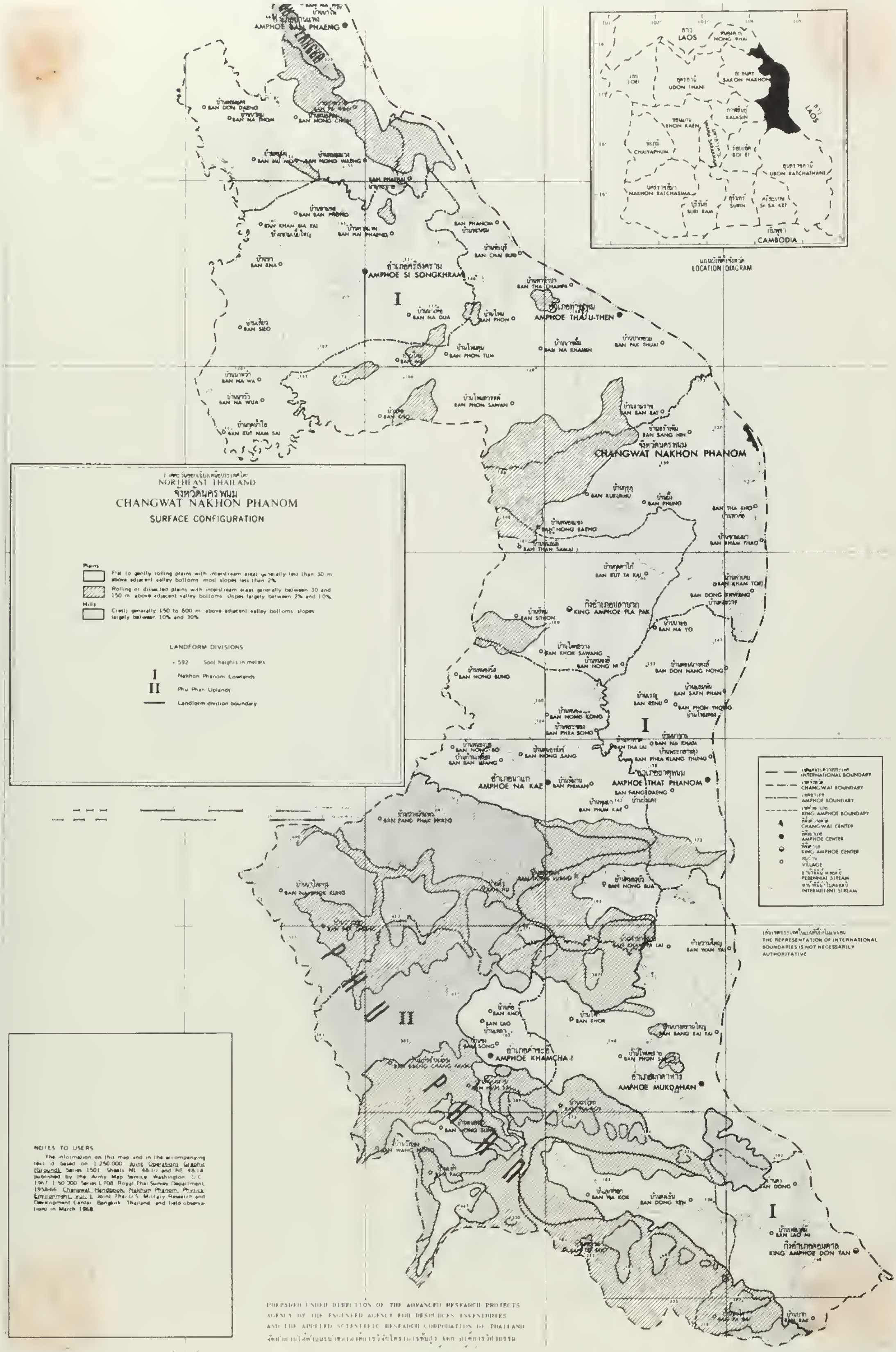
Amphoe Chiang Khong Factor Names and Numbers

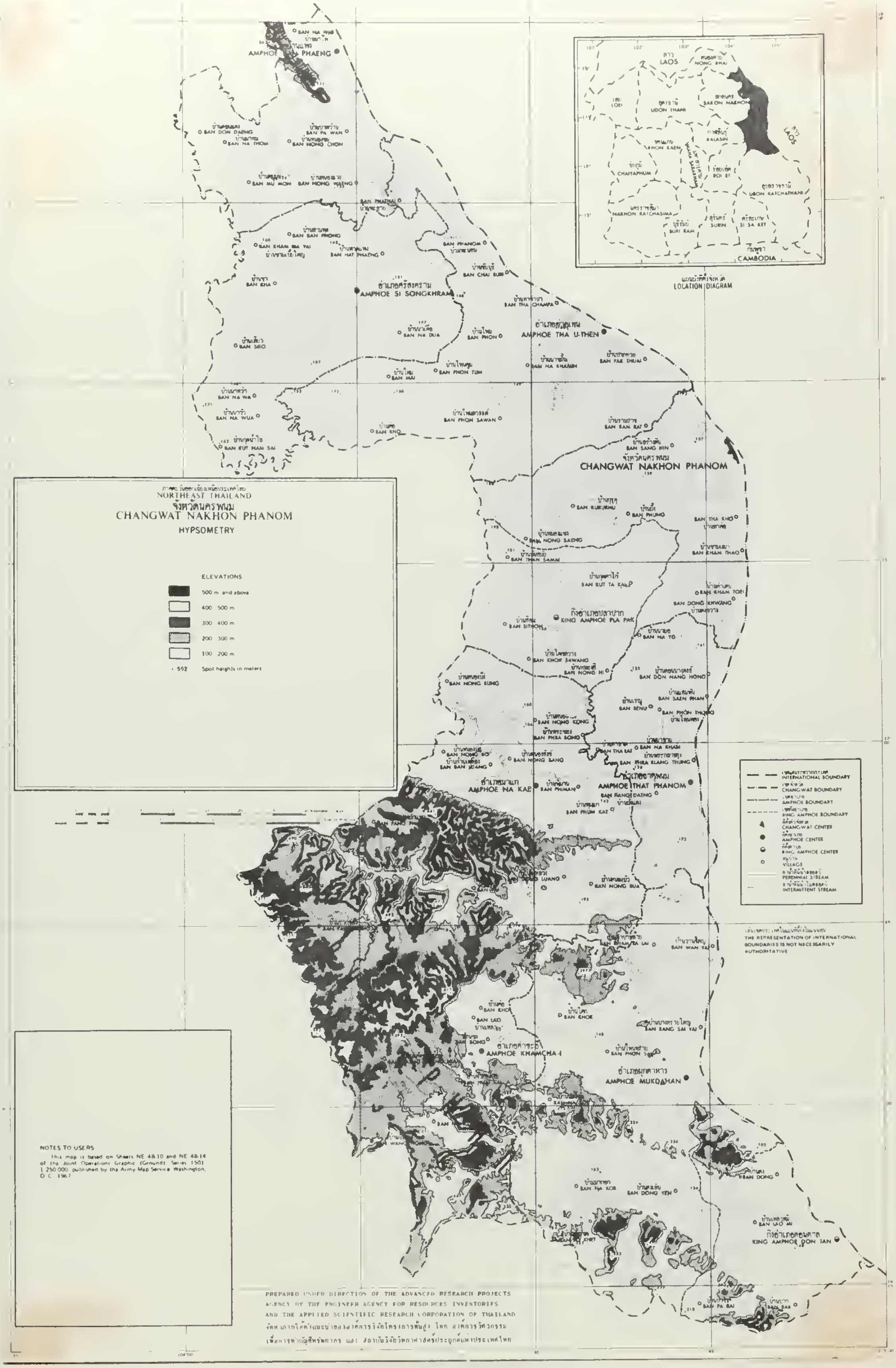
Variables No.	Name	RTA 1	CT-Violent 2	Paramilitary 3	Tribes 4	Police 5	Viet/Pathet Lao 6	Date/Time 7	Police/Pathet Lao 8	Unknown Initiator 9	Paramilitary Initiated 10
1	Incident Code	M	H-		L-						
2	RTA Reported	VH-									
3	Civilian Reported	L	L	L		L	VH-				
4	Police Reported					VH-					
5	Paramilitary Reported			VH-							
6	Source Reported		L-		M		L-			L	M-
7	Unknown Reporter	L						VH			
8	RTA Initiated	VH-							L		
9	Police Initiated								VH		
10	Paramilitary Initiated			H-							M
11	CT Initiated		VH			L-					
12	Unknown Initiator									VH-	
13	RTA Target	VH-									
14	Civilian Target		VH								
15	Police Target					VH-			M		
16	Paramilitary Target			VH-							
17	Unknown Target										VH

No.	Name	RTA 1	CT-Violent 2	Paramilitary 3	Tribes 4	Police 5	Viet/Pathet Lao 6	Date/Time 7	Police/Pathet Lao 8	Unknown Initiator 9	Paramilitary Initiated 10
18	Day							H-			
19	Month	L-								H-	
20	Arms or Uniforms	L-			H			L-		L-	
21	Pathet Lao						M		H		
22	Tribesmen	L			H						
23	Vietnamese						VH				
24	Other Ethnic Groups	L			VH-						
25	Number of CT						VH	L			
26	Number of Non-Ct		L			M-					
27	Hour	M-		L-				M-		L-	

APPENDIX H

ORIENTATION MAPS OF CHANGWAT NAKHON PHANOM (U)




NORTHEAST THAILAND
CHANGWAT NAKHON PHANOM
HYPSOMETRY
ELEVATIONS
500 m and above
400 500 m
300 400 m
200 300 m
100 200 m
Spot heights in meters
LOCATION DIAGRAM
LAOS
CAMBODIA
CHANGWAT NAKHON PHANOM
AMPHOE SI SONGKHRAM
AMPHOE THA U-THEN
KING AMPHOE PLA PAK
AMPHOE NA KAE
AMPHOE THAT PHANOM
AMPHOE KHAMCHA-I
AMPHOE MUKDAHAN
KING AMPHOE DON TAN
INTERNATIONAL BOUNDARY
CHANGWAT BOUNDARY
AMPHOE BOUNDARY
KING AMPHOE BOUNDARY
CHANGWAT CENTER
AMPHOE CENTER
KING AMPHOE CENTER
VILLAGE
PERENNIAL STREAM
INTERMITTENT STREAM
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PRINCIPAL COMPONENTS ANALYSIS 6264 INCIDENTS

ROTATED FACTOR MATRIX

VAR	FACTORS 1	2	3	4	5	6	7	8	9	10
1	-0.67073	0.27884	0.22984	-0.16016	0.05794	0.06142	0.03139	0.12241	-0.09219	0.02709
2	0.01646	-0.78320	0.10605	-0.07663	-0.12348	0.06492	0.11197	0.11460	-0.03488	-0.10485
3	0.14892	0.24811	0.20558	-0.17985	-0.06540	0.43180	-0.70233	0.04717	0.10369	0.08481
4	0.08311	0.13682	0.10528	0.75267	-0.04210	-0.01652	0.08415	0.08464	0.01601	-0.10332
5	0.01408	0.12363	-0.75803	-0.09685	-0.08520	0.05301	0.11021	0.13113	0.01067	-0.13435
6	-0.12941	0.14527	0.09227	-0.07138	-0.15001	-0.86639	-0.07479	-0.04483	0.01460	0.04803
7	-0.13332	0.14292	0.10910	-0.06184	0.41149	0.19193	0.58173	-0.23600	-0.11278	0.16787
8	-0.05255	-0.83243	-0.01242	0.03477	0.01041	0.03353	-0.07411	0.02643	0.04227	0.01833
9	-0.09349	-0.07410	-0.08807	0.74265	0.00362	0.09437	-0.09712	0.00500	0.00477	0.08197
10	-0.05235	-0.03343	-0.80303	0.06967	0.01134	0.04335	-0.07740	-0.00677	0.00885	0.08880
11	0.89863	0.00747	0.00302	0.05485	-0.11166	0.07889	0.09105	0.13078	-0.03201	-0.05510
12	0.02499	-0.00609	-0.05826	-0.01675	0.01416	0.03587	-0.06390	-0.00079	0.73911	0.23873
13	0.14577	-0.87300	0.03450	0.02600	-0.04162	0.03022	0.04590	0.06477	-0.01022	0.02488
14	0.72964	0.18837	0.15575	-0.13674	-0.05911	0.17360	-0.17612	0.04744	0.09471	0.09821
15	0.13250	-0.05500	-0.01940	0.85725	-0.02943	0.03470	0.03759	0.03689	0.00326	0.02073
16	0.14557	0.02954	-0.86556	0.02466	-0.01714	0.02543	0.04575	0.04661	0.01594	0.01390
17	0.03786	0.00587	0.02882	0.03829	0.05186	-0.06500	0.08729	-0.01138	0.68053	-0.25827
18	-0.04264	-0.02675	-0.02361	0.05645	0.08476	-0.09500	-0.06954	0.65061	-0.00132	0.03709
19	0.00309	0.04546	0.01505	0.00914	-0.02654	-0.05146	0.06081	0.03733	-0.00070	0.89077
20	0.49715	-0.29601	-0.23105	0.16661	0.21446	-0.31646	-0.39578	0.00571	-0.08674	0.01204
21	-0.02304	0.05288	0.03109	-0.03003	0.72346	0.01014	0.01202	0.04621	-0.00061	-0.05294
22	-0.02347	0.07525	0.08330	-0.00208	0.21295	-0.01663	-0.45992	-0.25212	-0.12821	-0.04005
23	-0.05644	0.03698	0.02485	-0.02701	0.62665	0.02419	-0.03415	-0.04981	0.06601	0.01652
24	-0.43618	0.29247	0.22867	-0.16504	-0.32573	0.29832	0.36800	0.03560	0.08845	0.05747
25	0.05901	0.02478	0.01211	-0.00171	0.20880	-0.09654	-0.01763	-0.55677	0.01133	0.03412
26	-0.03568	-0.03053	-0.08672	0.11655	-0.06029	0.23035	-0.12543	-0.11665	-0.03644	-0.01852
27	0.22154	-0.12978	-0.11542	0.05469	0.07892	-0.03968	0.12767	0.60227	-0.01135	0.03130

FACTOR ANALYSIS 6264 INCIDENTS

ROTATED FACTOR MATRIX

VAR	FACTORS 1	2	3	4	5	6	7	8	9	10
1	-0.67054	-0.27930	-0.23011	-0.16019	-0.05776	-0.06149	0.03221	0.12235	0.09212	0.02646
2	0.01625	0.78300	-0.10606	-0.07686	0.12386	-0.06516	0.11213	0.11437	0.03454	-0.10622
3	0.14915	-0.24868	-0.20609	-0.17999	0.06545	-0.43245	-0.70155	0.04721	-0.10388	0.08425
4	0.08321	-0.13653	-0.10502	0.75283	0.04212	0.01681	0.08400	0.08420	-0.01601	-0.10368
5	0.01409	-0.12371	0.75811	-0.09687	0.08519	-0.05295	0.11013	0.13101	-0.01074	-0.13466
6	-0.12980	-0.14508	-0.09201	-0.07131	0.15028	0.86622	-0.07566	-0.23590	0.11301	0.16865
7	-0.13309	-0.14274	-0.10896	-0.06165	-0.41191	-0.19110	0.58182	-0.23593	0.11301	0.16865
8	-0.05285	0.83243	0.01240	0.03447	-0.01030	-0.03392	-0.07444	0.02676	-0.04246	0.01916
9	-0.09371	0.07420	0.08806	0.74250	-0.00339	-0.09484	-0.09723	0.00516	-0.00480	0.08250
10	-0.05270	0.03330	0.80296	0.06942	-0.01104	-0.04400	-0.07759	-0.00650	-0.00890	0.08929
11	0.89889	-0.00720	-0.00264	0.05506	0.11141	-0.07822	0.09090	0.13009	0.03198	-0.05596
12	0.02491	0.00579	0.05801	-0.01691	-0.01422	-0.03613	-0.06375	-0.00041	-0.73906	0.2391
13	0.14556	0.87305	-0.03441	0.02576	0.04168	-0.03037	0.04557	0.06490	0.01000	0.0252
14	0.72984	-0.18836	-0.15573	-0.13666	0.05886	-0.17338	-0.17593	0.04722	-0.09466	0.0978
15	0.13239	0.05526	0.01963	0.85726	0.02956	-0.03477	0.03733	0.03668	-0.00328	0.0208
16	0.14535	-0.02956	0.86568	0.02452	0.01731	-0.02569	0.04550	0.04665	-0.01601	0.0140
17	0.03803	-0.00581	-0.02850	0.03852	-0.05196	0.06577	0.08725	-0.01212	-0.68058	-0.25847
18	-0.04238	0.02642	0.02352	0.05656	-0.08475	0.09509	-0.06957	0.65047	0.00110	0.03617
19	0.00333	-0.04610	-0.01555	0.00877	0.02697	0.05076	0.06141	0.03719	0.00045	0.89027
20	0.49654	0.29627	0.23139	0.16653	-0.21424	0.31614	-0.39687	0.00551	0.08679	0.01372
21	-0.02322	-0.05270	-0.03093	-0.02985	-0.72348	-0.00995	0.01169	0.04613	0.00081	-0.05243
22	-0.02368	-0.07535	-0.08331	-0.00215	-0.21257	0.01613	-0.45995	-0.25256	0.12801	-0.04093
23	-0.05660	-0.03698	-0.02480	-0.02693	-0.62654	-0.02420	-0.03424	-0.04994	-0.06605	0.01555
24	-0.43547	-0.29280	-0.22902	-0.16505	0.32578	-0.29809	0.36931	0.03523	-0.08862	0.05475
25	0.05883	-0.02472	-0.01188	-0.00175	-0.20860	0.09662	-0.01774	-0.55726	-0.01147	0.03252
26	-0.03571	0.03057	0.08672	0.11647	0.06046	-0.23055	-0.12527	-0.11674	0.03658	-0.01676
27	0.22178	0.12982	0.11547	0.05476	-0.07886	0.03987	0.12769	0.60201	0.01125	0.03090

PRINCIPAL COMPONENTS ANALYSIS 2526 INCIDENTS

ROTATED FACTOR MATRIX

VAR	FACTORS									
	1	2	3	4	5	6	7	8	9	10
1	0.33601	0.30043	-0.55813	-0.09994	0.06394	0.13367	0.00515	0.01092	-0.28115	0.01894
2	0.08558	-0.79063	-0.05452	-0.03151	-0.10620	0.01568	0.02869	-0.01023	-0.17774	0.05476
3	0.19183	0.15673	0.38825	-0.03532	-0.09551	-0.01567	-0.67353	0.02069	-0.00691	-0.08345
4	0.17347	0.11537	0.15895	0.52712	-0.09373	-0.08641	0.30643	0.07587	-0.30932	0.01995
5	-0.80498	0.11206	0.04247	-0.11406	-0.09139	0.01928	0.09795	0.00077	-0.18014	0.04778
6	0.17619	0.20078	-0.18489	-0.05199	-0.00328	-0.75257	0.24037	-0.05922	0.24796	0.01675
7	0.16214	0.18693	-0.22871	0.02417	0.27931	0.71043	0.20047	0.01905	0.16262	-0.02800
8	0.00538	-0.89070	-0.00865	0.04309	0.04639	-0.01708	0.00638	-0.00431	0.04332	0.02601
9	-0.10988	-0.05182	-0.05405	0.83300	0.01410	0.01791	-0.05987	-0.02746	0.05611	0.01597
10	-0.78784	-0.01231	-0.06214	0.25519	0.07487	-0.03497	-0.05290	0.00942	0.05102	-0.02125
11	-0.09716	0.02712	0.88307	-0.01112	-0.05445	0.04032	0.00912	-0.01343	-0.06024	0.04388
12	0.00733	-0.00144	0.02582	0.01279	-0.03348	0.04048	-0.46556	-0.00086	0.01443	-0.05241
13	0.01106	-0.91564	0.08588	0.06926	0.03627	-0.00759	0.04487	-0.01373	0.01876	0.02236
14	0.13730	0.11483	0.79065	-0.00818	0.00730	0.02262	-0.31292	-0.02304	0.01996	0.05698
15	-0.09571	-0.02819	0.05905	0.87630	-0.00365	-0.01110	0.06232	0.01594	-0.02469	0.00028
16	-0.88086	0.02422	0.16679	0.13648	0.01996	-0.00624	0.07475	-0.00516	-0.01277	0.00233
17	0.02275	-0.00981	0.18475	-0.00293	-0.26184	0.23883	0.39356	0.04473	0.15096	-0.36141
18	-0.02503	-0.02998	0.00109	0.08626	-0.08212	-0.05629	-0.00895	0.10109	-0.11761	0.70661
19	-0.01442	0.07210	-0.12180	0.05976	-0.06155	-0.10261	-0.20071	0.10732	-0.26406	-0.62151
20	-0.29499	-0.32315	0.49665	0.11487	0.39719	-0.39302	0.07147	-0.02536	0.14741	-0.08712
21	0.06653	0.08501	-0.07396	-0.03025	0.72039	0.18217	0.03817	0.08842	0.00340	-0.00409
22	-0.00759	-0.01637	0.02414	-0.01861	-0.12705	0.04480	0.05193	0.78127	0.06645	0.02709
23	0.00581	0.04013	-0.06621	0.00483	0.29568	-0.00077	-0.05092	0.71604	-0.01971	-0.00687
24	0.27080	0.29378	-0.45082	-0.09920	-0.53108	0.36644	-0.07313	-0.07975	-0.12539	0.07506
25	0.06356	0.06232	0.14075	0.02896	0.08870	-0.04757	0.04153	0.01567	0.71573	0.06025
26	-0.25752	-0.10955	-0.03583	0.46255	0.06231	0.11685	-0.24190	-0.07070	0.19164	0.05878
27	-0.10570	-0.10416	0.33609	0.01155	0.29148	0.05412	0.12067	-0.14499	-0.48246	0.15437

FACTOR ANALYSIS 2526 INCIDENTS

ROTATED FACTOR MATRIX

VAR	FACTORS 1	2	3	4	5	6	7	8	9	10
1	-0.33598	-0.30051	-0.55831	-0.09982	0.06438	-0.13343	0.00514	0.01060	-0.28090	0.01865
2	-0.08580	0.79059	-0.05454	-0.03158	-0.10627	-0.01599	0.02866	-0.01008	-0.17779	0.05499
3	-0.19168	-0.15679	0.38809	-0.03516	-0.09539	0.01552	-0.67372	0.02052	-0.00696	-0.08342
4	-0.17349	-0.11544	0.15887	0.52706	-0.09392	0.08641	0.30638	0.07597	-0.30943	0.02001
5	0.80492	-0.11196	0.04246	-0.11423	-0.09146	-0.01958	0.09806	0.00079	-0.18025	0.04800
6	-0.17594	-0.20054	-0.18468	-0.05202	-0.00351	0.75289	0.24023	-0.05912	0.24777	0.01653
7	-0.16627	-0.18711	-0.22872	0.02428	0.27961	-0.71012	0.20072	0.01895	0.16300	-0.02820
8	-0.00554	0.89074	-0.00852	0.04304	0.04621	0.01682	0.00644	-0.00408	0.04325	0.02622
9	0.11004	0.05192	-0.05398	0.83303	0.01392	-0.01788	-0.05962	-0.02736	0.05610	0.01599
10	0.78796	0.01253	-0.06199	0.25510	0.07469	0.03478	-0.05263	0.00950	0.05093	-0.02112
11	0.09703	-0.02724	0.88307	-0.01120	-0.05474	-0.04056	0.00900	-0.01324	-0.06047	0.04410
12	-0.00722	0.00146	0.02575	0.01289	-0.03338	-0.04062	-0.46560	-0.00097	0.01451	-0.05235
13	-0.01124	0.91567	0.08601	0.06919	0.03603	0.00731	0.04492	-0.01346	0.01867	0.02260
14	-0.13731	-0.11495	0.79060	-0.00811	0.00718	-0.02276	-0.31308	-0.02301	0.01983	0.05713
15	0.09583	0.02826	0.05912	0.87630	-0.00391	0.01110	0.06253	0.01609	-0.02475	0.00035
16	0.88089	-0.02405	0.16691	0.13632	0.01969	0.00597	0.07498	-0.00501	-0.01293	0.00256
17	-0.02289	0.00974	0.18480	-0.00308	-0.26209	-0.23886	0.39351	0.04502	0.15088	-0.36128
18	0.02486	0.02978	0.00084	0.08620	-0.08191	0.05625	-0.00900	0.10092	-0.11758	0.70674
19	0.01464	-0.07194	-0.12177	0.05979	-0.06168	0.10244	-0.20079	0.10738	-0.26414	-0.62149
20	0.29511	0.32342	0.49704	0.11483	0.39668	0.39295	0.07156	-0.02503	0.14712	-0.08704
21	-0.06646	-0.08496	-0.07377	-0.03007	0.72055	-0.18187	0.03839	0.08832	0.00358	-0.00436
22	0.00747	0.01612	0.02393	-0.01875	-0.12702	-0.04492	0.05166	0.78134	0.06632	0.02735
23	-0.00580	-0.04025	-0.06628	0.00482	0.29578	0.00079	-0.05105	0.71602	-0.01975	-0.00681
24	-0.27092	-0.29404	-0.45122	-0.09918	-0.53063	-0.36642	-0.07322	-0.08005	-0.12513	0.07501
25	-0.06347	-0.06228	0.14095	0.02899	0.08857	0.04789	0.04158	0.01579	0.71574	0.06014
26	0.25764	0.10964	-0.03575	0.46260	0.06225	-0.11690	-0.24165	-0.07066	0.19171	0.05883
27	0.10557	0.10414	0.33611	0.01155	0.29142	-0.05428	0.12075	-0.14498	-0.48250	0.15445

PRINCIPAL COMPONENTS ANALYSIS 1266 INCIDENTS

ROTATED FACTOR MATRIX

VAR	FACTORS 1	2	3	4	5	6	7	8	9
1	-0.64352	0.29114	0.27342	0.08064	-0.02920	-0.20450	-0.09857	0.02320	0.04122
2	-0.03806	-0.78010	0.11933	0.01713	0.01890	-0.29617	-0.00872	0.06760	0.01777
3	0.10495	0.22082	0.17579	0.05991	-0.14757	-0.16174	-0.35799	-0.73109	-0.00997
4	0.13682	0.11035	0.11893	-0.71424	0.00762	-0.13994	-0.03625	0.15860	0.04049
5	0.20662	0.16578	-0.79108	0.11450	0.04296	-0.18238	0.00971	0.14980	-0.01571
6	-0.11770	0.22384	0.18454	0.03310	-0.65093	0.35366	0.26006	0.31730	-0.13581
7	-0.16090	0.17165	0.13453	0.02399	0.77258	0.29497	0.09830	0.15195	0.13420
8	0.04383	-0.89595	0.02643	-0.00836	-0.00943	0.03935	0.03362	-0.01660	0.01954
9	-0.08905	-0.11184	-0.15637	-0.75545	-0.00967	0.06061	0.03056	-0.12193	-0.03641
10	-0.07860	-0.03610	-0.79456	-0.17826	-0.07318	0.06179	0.01670	-0.12763	0.03130
11	0.88055	0.11159	-0.08625	-0.03574	0.08223	-0.14506	-0.03410	0.00780	-0.02182
12	0.01658	-0.00510	-0.00006	0.04066	0.06390	0.06291	0.35878	-0.51907	-0.08802
13	0.16666	-0.91017	0.04145	-0.05385	0.01481	0.00728	0.01016	0.02702	0.02134
14	0.66476	0.16079	0.22433	0.01984	0.01232	-0.01995	0.07910	-0.42908	-0.00800
15	0.07125	-0.04448	-0.11649	-0.89025	0.00335	0.01629	0.01150	-0.01648	-0.00725
16	0.30442	0.07114	-0.86310	-0.08688	0.02081	-0.03317	0.00830	0.08172	-0.01193
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.02206	-0.04249	-0.00434	-0.07755	-0.24596	-0.27386	0.43678	0.00869	0.44953
19	0.02344	0.10896	0.03077	0.01611	-0.02708	0.00484	0.21350	-0.16846	-0.61595
20	0.60990	-0.42017	-0.27247	-0.08091	-0.30104	0.23643	-0.12657	0.01138	-0.02592
21	-0.02451	0.00246	0.01823	-0.00312	-0.01285	0.04278	-0.70521	0.00343	0.05148
22	0.00886	0.03277	0.00484	0.02264	0.06172	0.12035	0.07272	-0.08207	0.60094
23	-0.01773	0.04438	0.01881	0.01699	-0.31670	0.08105	-0.00197	-0.02214	0.26431
24	-0.59799	0.41314	0.26877	0.07458	0.29454	-0.22721	0.10643	-0.00426	-0.00989
25	0.07568	0.05756	0.03277	0.04329	-0.01570	0.71696	-0.05310	0.00123	0.14972
26	0.02380	-0.20134	-0.25030	-0.20137	0.01200	0.18329	0.02311	-0.34500	0.06774
27	0.42814	-0.19533	-0.17359	0.01478	-0.04127	-0.37628	0.11811	0.07047	0.11060

UNCLASSIFIED

FACTOR ANALYSIS 1266 INCIDENTS

ROTATED FACTOR MATRIX

VAR	FACTORS 1	2	3	4	5	6	7	8	9
1	-0.86259	-0.08710	0.25646	0.19719	0.04102	0.09095	-0.14951	0.10393	-0.17535
2	0.00744	0.25523	0.16000	-0.66593	-0.07098	0.13307	-0.15871	0.23192	-0.13167
3	0.41357	0.33521	0.15286	0.24095	-0.17019	0.22166	-0.20288	-0.02983	0.48215
4	-0.12825	0.18742	0.09611	0.12462	-0.23164	0.14048	-0.05774	-0.35846	-0.46030
5	-0.11176	0.22168	0.07877	0.06258	0.03782	-0.78491	0.07373	-0.12178	0.03956
6	0.03427	0.24366	-0.83809	0.02120	0.02221	0.07650	0.05513	0.01652	-0.11259
7	-0.19496	-0.74381	0.23380	0.12907	0.20368	0.17751	0.17318	0.07864	-0.04967
8	0.15534	0.02601	-0.00206	-0.77972	-0.00270	0.05574	-0.06010	-0.13972	0.07290
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.99190	0.12150	0.20083	-0.01082	-0.06725	-0.14007	0.12599	-0.07198	-0.04094
12	-0.03446	0.06310	0.00978	0.01328	-0.09642	0.03830	0.01911	-0.09784	0.72299
13	0.62081	0.04715	0.16449	-0.60950	-0.02547	0.08107	0.42907	-0.12794	0.00223
14	0.66536	0.17792	0.13349	0.30626	-0.03673	0.11446	-0.28311	-0.05693	0.02695
15	0.38866	-0.04067	0.18433	-0.06149	-0.00748	0.04033	0.75179	-0.07548	-0.07372
16	0.36100	-0.02758	-0.03504	-0.03729	-0.06115	-0.59838	-0.20583	0.02056	-0.06691
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	-0.03067	0.02946	-0.05806	0.06430	-0.12121	0.13681	0.02041	0.81959	-0.05821
19	-0.06356	0.20269	0.66230	0.21007	0.16746	-0.00660	0.24050	-0.00229	-0.27497
20	0.71810	-0.23054	-0.19533	-0.09575	0.01453	0.06439	0.09345	0.20030	-0.01721
21	-0.06815	-0.79479	-0.04814	0.05069	-0.08405	0.02930	-0.11179	-0.03871	0.01334
22	-0.03342	-0.02702	0.12525	0.01553	0.75318	0.04443	-0.15485	-0.24030	-0.04459
23	-0.03247	-0.07668	0.03768	0.08699	0.79564	0.02859	-0.05248	0.05152	-0.07420
24	-0.53141	0.62796	0.13249	-0.10270	-0.17999	-0.02260	0.07057	0.01403	0.05106
25	0.01815	-0.47494	-0.56843	0.09332	-0.10546	0.05768	0.07271	0.01656	-0.07246
26	-0.06029	-0.00983	0.12702	0.02747	-0.05537	-0.38793	-0.00464	0.39904	-0.00997
27	0.12095	-0.32336	0.15078	-0.22015	-0.43183	0.07684	-0.40589	0.02591	-0.27032

UNCLASSIFIED

PRINCIPAL COMPONENTS ANALYSIS 358 INCIDENTS

ROTATED FACTOR MATRIX

VAR	FACTORS 1	2	3	4	5	6	7	8	9
1	0.50681	0.34861	-0.07108	0.08154	-0.42216	0.04435	-0.19671	-0.17994	0.17029
2	0.05366	-0.03324	-0.02315	-0.63582	-0.15611	0.16754	-0.13586	0.24695	0.02260
3	-0.71626	0.20819	-0.06072	0.09721	0.02760	0.33038	-0.26775	-0.17663	0.08765
4	0.04738	0.05848	0.73243	-0.00456	-0.01685	0.07494	-0.03680	-0.08749	-0.14830
5	0.14473	-0.77757	-0.10296	0.03990	-0.19417	0.10452	0.03672	-0.20111	-0.22666
6	0.53960	0.32196	-0.10485	0.09729	0.46499	0.24798	0.28008	0.00909	-0.15738
7	0.07577	0.10266	0.04440	0.08267	-0.23739	-0.77402	0.05899	0.24575	0.27608
8	0.01705	0.03032	-0.00468	-0.79736	0.09454	-0.06042	0.07775	-0.09617	0.05718
9	-0.00003	-0.09959	0.88480	0.01926	0.08813	-0.05300	0.02310	0.06646	0.10264
10	0.04717	-0.89575	0.05190	0.00886	0.24994	-0.02279	-0.05614	0.09776	0.10498
11	-0.83801	0.07008	0.01363	-0.06413	0.19298	0.07890	0.08072	0.06077	-0.33983
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	-0.03563	0.02269	-0.00396	-0.87954	0.03966	-0.02551	0.02813	0.01726	-0.05268
14	-0.85693	0.10854	-0.05213	0.05014	0.19650	0.07156	0.09364	0.02646	-0.28111
15	-0.00848	-0.07254	0.93556	0.01567	0.08802	-0.04044	0.01641	0.08414	0.03598
16	0.02954	-0.90048	0.06871	0.00682	0.24688	-0.01338	-0.05590	0.10334	0.05734
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.02858	0.00784	0.04900	-0.07178	-0.03797	0.02679	0.03209	0.83079	-0.02395
19	0.08781	-0.05241	0.06376	-0.14377	-0.15145	0.11911	-0.45220	0.13110	0.52806
20	-0.21276	-0.16118	0.07550	-0.01474	0.87239	0.09492	0.06994	-0.01874	-0.05395
21	0.09517	0.01142	-0.04021	-0.01722	0.06078	-0.70138	-0.18257	-0.22332	-0.19381
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.01368	0.01850	-0.03172	0.04762	0.06527	-0.13131	-0.77840	-0.05071	-0.01508
24	0.17140	0.09579	-0.08730	0.00939	-0.88877	0.00514	0.14330	0.05336	0.08581
25	-0.52107	0.09087	-0.07834	0.08677	0.16162	-0.21515	0.36937	-0.21500	0.28812
26	-0.00961	-0.37721	0.24780	-0.00657	-0.09117	0.09284	0.15001	-0.28046	-0.05567
27	-0.28770	-0.06585	0.06256	-0.02732	0.09410	0.04777	-0.08931	0.06790	-0.72074

FACTOR ANALYSIS 358 INCIDENTS

ROTATED FACTOR MATRIX

VAR	FACTORS 1	2	3	4	5	6	7	8	9
1	-0.83043	0.05908	0.27421	-0.19692	0.02289	-0.09387	-0.15603	-0.09949	-0.17235
2	-0.00461	-0.27579	0.16745	0.69495	-0.08061	-0.13596	-0.16127	-0.23659	-0.13762
3	0.42273	-0.34757	0.15917	-0.26166	-0.17284	-0.22611	-0.21127	0.02337	0.49294
4	-0.11764	-0.20264	0.10733	-0.12313	-0.24873	-0.14184	-0.05676	0.37108	-0.45572
5	-0.10755	-0.25685	0.07680	-0.06708	0.04452	0.81054	0.07430	0.12989	0.03753
6	0.03430	-0.22757	-0.87798	-0.02304	0.03742	-0.07724	0.05676	-0.01274	-0.10533
7	-0.20054	0.78267	0.24705	-0.12835	0.20350	-0.18834	0.17880	-0.08344	-0.05844
8	0.13012	-0.02903	-0.00758	0.81309	0.00402	-0.06292	-0.06212	0.14146	0.06519
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.96277	-0.10241	0.20750	0.00397	-0.06188	0.14907	0.13567	0.06679	-0.04597
12	-0.02932	-0.07940	0.00363	-0.02060	-0.08765	-0.04574	0.01116	0.09316	0.72961
13	0.57643	-0.04116	0.16157	0.63748	-0.01186	-0.08800	0.44379	0.12342	-0.00779
14	0.66661	-0.16358	0.14336	-0.32801	-0.04047	-0.11117	-0.28676	0.05503	0.03200
15	0.35746	0.04560	0.18266	0.07080	0.00585	-0.04501	0.77482	0.07012	-0.07963
16	0.35194	0.03806	-0.03278	0.02990	-0.06312	0.62165	-0.20860	-0.01963	-0.07402
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	-0.02790	-0.01983	-0.05280	-0.07157	-0.13705	-0.13389	0.02287	-0.84157	-0.06070
19	-0.05807	-0.23787	0.68775	-0.20970	0.16298	0.00976	0.25085	0.00466	-0.27529
20	0.68925	0.28168	-0.20306	0.09302	0.02233	-0.06438	0.10090	-0.21160	-0.02456
21	-0.07413	0.84850	-0.03976	-0.05470	-0.09303	-0.03448	-0.11528	0.03569	0.00455
22	-0.02890	0.02573	0.11789	-0.00914	0.78240	-0.04875	-0.15640	0.25430	-0.04323
23	-0.02956	0.08458	0.02076	-0.08438	0.82550	-0.03050	-0.05025	-0.04488	-0.07458
24	-0.51130	-0.69790	0.13440	0.11175	-0.18868	0.02396	0.06779	-0.01029	0.05976
25	0.01009	0.52893	-0.58722	-0.09915	-0.10327	-0.06155	0.07465	-0.01888	-0.07537
26	-0.05909	0.00232	0.13618	-0.03287	-0.06423	0.40419	-0.00411	-0.40798	-0.01581
27	0.11570	0.34974	0.17577	0.22495	-0.46451	-0.07637	-0.41420	0.02385	-0.27831

PRINCIPAL COMPONENTS ANALYSIS 196 INCIDENTS

ROTATED FACTOR MATRIX

VAR	FACTORS 1	2	3	4	5	6	7	8	9
1	-0.46431	0.37221	0.27216	0.10937	0.00287	0.06593	-0.19246	-0.24145	-0.16209
2	-0.13197	0.05966	-0.79700	-0.00340	0.00738	0.07778	0.00868	0.06239	-0.08032
3	-0.11331	-0.73530	0.07133	0.03006	-0.02669	0.01796	-0.00139	0.13385	-0.03720
4	-0.28242	0.08434	0.09238	-0.52560	0.04616	-0.05915	0.07431	0.17482	-0.23359
5	0.63288	0.19516	0.22553	0.13739	0.30583	0.13466	0.13424	0.00311	-0.38279
6	-0.07953	0.04150	0.05229	0.02579	0.06067	-0.84019	0.00846	-0.02316	0.13446
7	-0.31205	0.20802	0.23480	0.00475	-0.36002	0.44117	-0.17438	-0.18543	0.45615
8	0.06801	0.03555	-0.86135	0.01683	0.03764	0.02135	-0.09914	0.00496	0.02306
9	0.09707	-0.00487	-0.05853	-0.86496	0.12470	0.03899	0.01980	0.01497	0.04806
10	0.82133	0.08970	0.04886	-0.17286	-0.00085	0.09556	0.03000	0.09997	0.04825
11	-0.03562	-0.48739	0.03118	0.06179	-0.14172	0.04845	0.06646	0.62315	-0.17225
12	0.09246	-0.70158	-0.02965	0.01095	0.03811	0.00249	0.00643	-0.43982	0.05090
13	0.00550	0.00558	-0.85422	-0.06970	0.03347	0.07757	0.08239	0.12242	0.08951
14	-0.02229	-0.85938	0.05730	0.01685	-0.10561	-0.00070	0.01462	0.19295	-0.05450
15	0.30753	0.02461	-0.06134	-0.78981	-0.05262	0.06880	0.02940	-0.03945	0.03831
16	0.81634	0.02467	0.03506	-0.02872	-0.07929	0.07059	-0.04930	0.25398	-0.03595
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.01410	0.12202	0.06122	-0.13986	0.72108	-0.10217	-0.04034	0.12917	-0.23647
19	-0.00153	-0.02872	0.12581	0.00115	-0.78191	-0.19263	0.01631	0.05259	-0.19485
20	0.41581	-0.06801	-0.23371	-0.09658	0.08127	-0.03602	0.09213	0.68532	0.14493
21	-0.11799	0.01345	0.14623	0.05758	0.15122	0.10974	-0.63062	0.12138	0.38480
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.06832	0.04478	-0.10102	0.02487	-0.06644	-0.13122	-0.81578	-0.05119	-0.21545
24	-0.34728	0.04064	0.16861	0.04732	-0.20559	-0.04216	0.18143	-0.70277	-0.20453
25	0.06162	0.06751	-0.04729	0.01934	-0.00504	-0.21805	0.06696	0.11282	0.72696
26	0.47184	-0.06587	-0.02176	-0.39085	0.07692	0.08609	-0.28131	-0.10132	0.07786
27	0.17972	-0.00168	-0.16977	-0.06058	0.22523	0.55386	0.08866	0.02873	-0.05927

FACTOR ANALYSIS 196 INCIDENTS

ROTATED FACTOR MATRIX

VAR	FACTORS 1	2	3	4	5	6	7	8	9
1	-0.82303	-C.08997	0.26592	0.19962	0.03426	0.09651	-0.15298	0.09863	-0.17263
2	-0.00202	0.24840	0.14142	-0.66848	-0.07278	0.12219	-0.16821	0.23624	-0.12574
3	0.40430	0.31877	0.17183	0.22196	-0.17418	0.25290	-0.21539	-0.02488	0.49864
4	-0.11794	0.18148	0.10683	0.12979	-0.24588	0.14385	-0.06223	-0.38726	-0.45697
5	-0.11023	0.21039	0.08220	0.06810	0.04346	-0.81831	0.07617	-0.11843	0.02513
6	0.02995	0.28324	-0.87130	0.02150	0.00993	0.08285	0.05326	0.01906	-0.11324
7	-0.18489	-0.74351	0.24621	0.13817	0.21651	0.17873	0.18865	0.07910	-0.05595
8	0.13370	0.02229	-0.03369	-0.78188	0.00563	0.03735	-0.06726	-0.14634	0.07810
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.95571	0.10210	0.22495	-0.01175	-0.05806	-0.14613	0.13226	-0.07095	-0.04746
12	-0.03912	0.05810	-0.00007	0.00324	-0.09401	0.05403	0.01544	-0.08758	0.73676
13	0.58079	0.03656	0.15483	-0.60025	-0.00869	0.06806	0.44687	-0.12854	0.00073
14	0.65333	0.16186	0.16569	0.29071	-0.03721	0.13216	-0.29538	-0.06232	0.03106
15	0.36426	-0.04579	0.19507	-0.04137	0.00723	0.03853	0.78812	-0.07101	-0.08171
16	0.34880	-0.03408	-0.03546	-0.03800	-0.06323	-0.06050	-0.21581	0.02517	-0.08009
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	-0.02641	0.04384	-0.06107	0.06765	-0.13708	0.14682	0.02438	0.85767	-0.05940
19	-0.05445	0.17295	0.70975	0.21620	0.18327	-0.00280	0.25784	-0.00365	-0.28067
20	0.68972	-0.22157	-0.19862	-0.09482	0.01802	0.06220	0.09916	0.21301	-0.02337
21	-0.06392	-0.78630	-0.05814	0.05586	-0.08920	0.02056	-0.11469	-0.04202	0.01012
22	-0.02579	-0.03814	0.15092	0.00106	0.79175	0.04680	-0.15543	-0.25908	-0.05031
23	-0.02419	-0.07880	0.06258	0.07627	0.83285	0.03191	-0.04625	0.04804	-0.08452
24	-0.51663	0.62163	0.12578	-0.10132	-0.19017	-0.01732	0.06922	0.01567	0.06063
25	0.01591	-0.44191	-0.59643	0.10183	-0.11877	0.05504	0.07511	0.01927	-0.07706
26	-0.05738	-0.01311	0.12950	0.03252	-0.05972	-0.40574	-0.00272	0.42161	-0.01962
27	0.11893	-0.01311	0.14152	-0.21937	-0.45481	0.06370	-0.42654	-0.03773	-0.26604

PRINCIPAL COMPONENTS ANALYSIS 140 INCIDENTS

ROTATED FACTOR MATRIX

VAR	FACTORS 1	2	3	4	5	6	7	8	9
1	-0.08269	0.53550	0.11471	-0.42265	0.00662	0.04624	0.31858	0.16711	-0.02610
2	0.74655	0.14546	0.07567	0.04071	0.05568	0.07631	0.14371	0.20091	0.10005
3	-0.04393	-0.65242	0.07224	-0.09901	0.15634	0.30801	0.23512	0.13065	-0.29510
4	-0.04026	-0.04749	0.03144	-0.06051	-0.02606	0.02904	0.00671	-0.12946	0.87445
5	0.03904	0.09644	0.08541	0.01240	0.14006	0.15625	-0.82114	0.04124	0.03864
6	-0.09409	0.25465	0.07535	0.71568	0.15599	-0.07517	0.27478	-0.37710	-0.05260
7	-0.20229	0.30384	-0.23229	-0.47891	-0.38952	-0.38313	0.05979	0.10080	-0.13026
8	0.88511	-0.01321	-0.15358	0.01361	0.01112	-0.05023	-0.30189	-0.08440	-0.05168
9	0.06176	0.01781	-0.93996	0.05551	-0.01157	0.03140	-0.12627	-0.03196	-0.01047
10	0.28566	0.04491	-0.43084	0.16039	-0.00424	-0.06362	-0.71900	0.02484	-0.06370
11	-0.08022	-0.89090	0.04947	0.14764	-0.03194	-0.05541	0.02731	0.06178	0.16354
12	-0.00862	-0.16610	0.01249	-0.13252	0.02550	0.52960	-0.03712	-0.26122	-0.11703
13	0.88511	-0.01321	-0.15358	0.01361	0.01112	-0.05023	-0.30189	-0.08440	-0.05168
14	-0.06715	-0.91244	0.04058	0.10545	-0.03015	0.08538	0.06924	-0.00880	0.12423
15	0.06176	0.01781	-0.93996	0.05551	-0.01157	0.03140	-0.12627	-0.03196	-0.01047
16	0.22887	-0.01355	-0.37857	0.17866	0.00946	-0.06286	-0.79060	0.05560	-0.02515
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	-0.04413	0.01820	-0.19896	-0.07507	-0.23888	0.70784	0.00112	0.15517	0.03609
19	0.11197	0.13605	0.01272	0.26699	0.36575	0.41959	-0.22282	0.38445	0.08910
20	0.04418	-0.35571	-0.14386	0.75554	-0.17700	-0.13381	-0.25060	0.11098	0.01954
21	0.00659	0.03960	0.00261	0.03602	0.01158	0.01404	0.03526	-0.73281	0.06645
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.01446	0.10930	0.07958	-0.01867	-0.75891	0.02832	0.00763	0.08214	0.01307
24	-0.05745	0.25780	0.12179	-0.76669	0.20875	0.09040	0.27198	-0.19447	0.06842
25	-0.05539	-0.11965	-0.05092	0.17089	-0.75793	0.11189	0.09479	-0.11374	-0.01999
26	0.03690	0.02206	-0.80809	-0.01821	0.03196	0.06918	-0.05241	0.07207	0.03261
27	0.10808	-0.30744	-0.09757	0.06748	0.14658	-0.18256	0.02233	0.39680	0.54681

FACTOR ANALYSIS 140 INCIDENTS

ROTATED FACTOR MATRIX

VAR	FACTORS 1	2	3	4	5	6	7	8	9
1	-0.91303	0.04724	0.27738	-0.21337	0.04595	-0.09651	-0.16012	-0.09911	-0.17823
2	0.01098	-0.30188	0.15670	0.68838	-0.07991	-0.12989	-0.15873	-0.23197	-0.13339
3	0.44910	-0.37244	0.14406	-0.23610	-0.17497	-0.22468	-0.20654	0.02932	0.49626
4	-0.13112	-0.21762	0.09910	-0.12205	-0.23628	-0.13691	-0.06670	0.37996	-0.45722
5	-0.11455	-0.27197	0.08430	-0.06145	0.03857	0.81608	0.07283	0.12813	0.03765
6	0.03417	-0.19105	-0.88567	-0.02037	0.00035	-0.07697	0.05575	-0.02366	-0.10419
7	-0.21881	0.80779	0.26671	-0.14786	0.22698	-0.19841	0.17910	-0.08554	-0.06350
8	0.16702	-0.03398	-0.00409	0.80639	-0.00523	-0.05324	-0.06427	0.14622	0.07204
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	1.05036	-0.11670	0.19989	0.02381	-0.06238	0.15025	0.14069	0.07313	-0.04289
12	-0.02678	-0.08442	0.00875	-0.01137	-0.09943	-0.04260	0.01524	0.09177	0.73411
13	0.65954	-0.05149	0.16808	0.63225	-0.02275	-0.07990	0.45077	0.12567	-0.00148
14	0.70655	-0.17770	0.12673	-0.30281	-0.03338	-0.11301	-0.28670	0.06370	0.03223
15	0.41179	0.04258	0.19542	0.06114	-0.00082	-0.04316	0.78544	0.06541	-0.07882
16	0.37768	0.03925	-0.03684	0.04528	-0.06212	0.62078	-0.21263	-0.01639	-0.07254
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	-0.03923	-0.01999	-0.06950	-0.07281	-0.13520	-0.14618	0.03589	-0.85013	-0.06264
19	-0.06274	-0.28003	0.69119	-0.21796	0.18484	0.01217	0.25674	0.00850	-0.28014
20	0.75081	0.30527	-0.20701	0.10066	0.01482	-0.07093	0.10619	-0.21376	-0.02265
21	-0.08525	0.88702	-0.02858	-0.05996	-0.07391	-0.04448	-0.12339	0.03771	0.00305
22	-0.03722	0.02716	0.13394	-0.02041	0.78270	-0.04429	-0.15836	0.25459	-0.04747
23	-0.04075	0.09410	0.04168	-0.09849	0.82280	-0.03141	-0.04663	-0.05060	-0.08032
24	-0.54754	-0.73814	0.12700	0.10833	-0.19616	0.03372	0.07076	-0.01103	0.06129
25	0.00727	0.58302	-0.58306	-0.10168	-0.11290	-0.07022	0.06975	-0.02572	-0.07585
26	-0.06763	-0.00634	0.13295	-0.03118	-0.05818	0.39906	0.00109	-0.41135	-0.01692
27	0.12266	0.34937	0.16300	0.23203	-0.43722	-0.07983	-0.42564	0.03750	-0.27634

UNCLASSIFIED

PRINCIPAL COMPONENTS ANALYSIS 93 INCIDENTS

ROTATED FACTOR MATRIX

VAR	FACTORS 1	2	3	4	5	6	7	8	9	10
1	0.43380	0.03082	0.37498	0.17397	-0.01671	-0.04764	0.53928	0.08237	0.14114	0.26086
2	0.05419	0.26246	0.11276	-0.73546	0.04910	-0.01772	0.03073	0.24579	0.10867	-0.00250
3	-0.67298	0.21802	0.09815	0.05999	0.11311	-0.07463	0.03478	0.04856	-0.46222	0.09739
4	0.05078	0.22023	0.13654	0.12885	0.18960	-0.57847	0.06698	-0.16829	0.33279	-0.07688
5	0.14132	0.34810	0.09383	0.16852	0.04555	0.56764	0.01311	-0.43230	0.08757	-0.39200
6	0.03943	0.19451	-0.86270	0.09413	-0.01695	-0.07957	0.00103	0.04820	0.13236	0.06509
7	0.30105	-0.72962	0.29090	0.18057	-0.19341	-0.05067	-0.07508	0.12991	0.00015	0.17389
8	0.03827	0.00152	-0.08428	-0.79920	0.00451	0.04751	-0.13064	-0.20850	-0.04316	0.05317
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	-0.59958	0.01537	0.09144	-0.04503	0.02782	-0.01380	-0.59762	-0.00912	0.05906	-0.39503
12	0.00404	0.08518	0.02195	0.04752	0.05653	-0.06114	0.00873	-0.02362	-0.82641	-0.03411
13	-0.08311	0.01859	0.04457	-0.52943	0.03677	-0.03926	-0.75611	-0.08777	-0.01473	-0.00575
14	-0.87265	-0.00506	0.04615	0.06756	0.00223	0.04238	-0.01205	-0.07051	0.11323	0.04267
15	0.10848	-0.00103	0.13471	0.12771	0.05711	-0.05221	-0.84274	-0.00057	0.03280	0.08085
16	0.00095	0.00868	-0.01907	0.03996	-0.00468	0.03227	-0.04986	0.04162	-0.03276	-0.93652
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.07080	0.02529	-0.02573	0.05271	0.10582	0.12848	0.04481	0.90421	0.01268	-0.04593
19	-0.03747	0.28017	0.66380	0.18815	-0.13041	0.03147	-0.19094	-0.01254	0.29777	0.14827
20	-0.33368	-0.36500	-0.27496	-0.10676	-0.04138	0.04994	-0.41334	0.25545	0.04511	-0.16300
21	0.10672	-0.85249	-0.00180	0.04433	0.09389	0.04919	0.13439	-0.09181	0.01704	0.04145
22	-0.00486	-0.01903	0.09693	-0.03239	-0.80058	-0.11291	0.07555	-0.19442	0.01501	-0.01009
23	0.05534	-0.06655	0.01662	0.06777	-0.82521	0.03910	0.02156	0.07972	0.06416	0.00103
24	0.25736	0.76410	0.16680	-0.07140	0.21534	0.00201	0.19197	-0.01908	-0.07919	0.17504
25	0.11507	-0.54757	-0.54971	0.16447	0.13331	0.02714	-0.00871	-0.01218	0.11902	0.09637
26	-0.02900	0.01466	0.13031	0.00085	0.14460	0.67930	0.09562	0.10092	0.20606	-0.02658
27	-0.10024	-0.38896	0.17750	-0.32372	0.36747	-0.29438	0.21994	0.06557	0.20201	-0.27171

FACTOR ANALYSIS 93 INCIDENTS

ROTATED FACTOR MATRIX

VAR	FACTORS 1	2	3	4	5	6	7	8	9	10
1	0.73417	0.02736	-0.28632	-0.20301	-0.01998	-0.02870	0.17264	-0.10289	0.14819	-0.14718
2	0.04505	-0.27096	-0.13433	0.69492	0.06109	-0.02727	0.16887	-0.28949	0.11539	0.00175
3	-0.45037	-0.29520	-0.15734	-0.17629	0.13662	-0.08795	0.22466	-0.03583	-0.51566	-0.26246
4	0.11447	-0.21902	-0.12866	-0.14593	0.19677	-0.56214	0.00226	0.17617	0.33759	0.08785
5	0.08552	-0.32172	-0.09471	-0.12970	0.03706	0.58893	-0.05007	0.42984	0.09489	0.41227
6	-0.03597	-0.20532	0.86393	-0.06660	-0.02244	-0.07501	-0.03583	-0.04041	0.13671	-0.03562
7	0.21231	0.77741	-0.24008	-0.11204	-0.21045	-0.05813	-0.20194	-0.12414	0.02411	-0.09427
8	-0.07328	-0.01032	0.05569	0.81383	0.01468	0.03267	0.09190	0.17599	-0.03077	-0.04810
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	-0.86852	-0.08714	-0.20008	0.03603	0.03798	-0.03053	-0.17792	0.04001	0.04076	0.21766
12	0.05005	-0.07115	-0.01252	-0.02576	0.04471	-0.06743	-0.05293	0.02628	-0.82341	0.07285
13	-0.46154	-0.02170	-0.10235	0.65183	0.01654	-0.06456	-0.45767	0.09658	0.00609	-0.00933
14	-0.70368	-0.10835	-0.13703	-0.22286	0.04541	0.03018	0.33731	0.08637	0.04665	-0.29686
15	-0.28091	0.04254	-0.14602	0.07328	0.00577	-0.06646	-0.80762	0.04053	0.06222	-0.02179
16	-0.24446	-0.02280	-0.02681	-0.06912	0.00874	0.04453	0.09394	-0.04018	-0.01126	0.89840
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.04463	-0.02019	0.03530	-0.08051	0.09451	0.12261	-0.04682	-0.90491	0.01405	0.05819
19	0.01767	-0.26014	-0.66092	-0.15896	-0.14514	0.03325	-0.24035	0.03015	0.29079	-0.16051
20	-0.60497	0.31503	0.21021	0.11225	-0.03624	0.02896	-0.11744	-0.23910	0.04000	0.06158
21	0.07849	0.85671	0.02741	-0.05293	0.10495	0.04676	0.12146	0.08165	0.02289	-0.03263
22	0.02646	0.02028	-0.09928	0.01770	-0.78981	-0.11714	0.14468	0.19535	0.02118	0.00658
23	0.02906	0.07705	-0.01152	-0.06281	-0.82524	0.03269	0.04316	-0.07385	0.07393	0.01108
24	0.45213	-0.72162	-0.12697	0.08970	0.19817	0.01651	-0.04668	0.00585	-0.07578	-0.08198
25	-0.00405	0.54932	0.57054	-0.12561	0.12983	0.02719	-0.05480	0.01633	0.12795	-0.06514
26	0.01134	-0.01626	-0.13302	-0.02715	0.14580	0.68343	0.08070	-0.11350	0.19050	-0.00921
27	-0.07146	0.35015	-0.20049	0.21169	0.40542	-0.29205	0.36907	-0.08983	0.19771	0.20235

PRINCIPAL COMPONENTS ANALYSIS 46 INCIDENTS

ROTATED FACTOR MATRIX

VAR	FACTORS 1	2	3	4	5	6	7	8
1	0.21295	0.27989	0.29445	0.33416	0.51798	0.11287	-0.34000	0.07289
2	0.04686	0.20002	0.14000	0.06772	-0.84362	0.06401	0.07640	0.12143
3	0.00728	-0.01532	0.07110	0.01104	-0.07291	-0.88618	-0.05706	-0.04509
4	-0.98915	-0.05039	0.01313	0.00930	-0.00790	0.01740	0.01860	0.00755
5	-0.01535	0.06085	-0.05343	-0.04131	0.05344	0.05559	-0.02994	0.79937
6	0.07769	0.13409	0.08947	0.11082	0.23630	0.20974	-0.85529	-0.04854
7	0.19147	-0.23161	-0.18459	-0.13627	0.28067	0.18723	0.77552	-0.23685
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	-0.98915	-0.05039	0.01313	0.00930	-0.00790	0.01740	0.01860	0.00755
11	0.00653	0.06707	-0.96071	0.04366	-0.02193	-0.00604	0.08012	0.03753
12	0.01716	0.06502	0.02916	-0.97719	0.03455	0.02906	0.05653	0.01294
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.01716	0.06502	0.02916	-0.97719	0.03455	0.02906	0.05653	0.01294
15	-0.98915	-0.05039	0.01313	0.00930	-0.00790	0.01740	0.01860	0.00755
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	0.00653	0.06707	-0.96071	0.04366	-0.02193	-0.00604	0.08012	0.03753
18	-0.17448	-0.07709	0.42088	0.23308	0.01275	0.23631	0.44666	0.23224
19	-0.29584	0.40734	0.00656	-0.19858	0.39852	0.17359	0.09965	-0.42839
20	-0.28254	-0.63297	0.12869	0.07691	-0.22221	-0.05803	0.26303	0.18013
21	0.12670	-0.86023	0.05455	0.05427	0.11492	0.07001	0.24073	0.02362
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	-0.44208	-0.55114	-0.05544	-0.03763	0.01654	0.09666	-0.12453	-0.20329
24	0.23491	0.81090	-0.05963	-0.04156	-0.03149	-0.02627	-0.04472	0.10829
25	-0.80578	-0.51439	0.02675	0.01646	-0.07108	-0.08395	-0.01059	-0.03523
26	0.00904	0.07395	-0.11976	0.03873	0.14661	-0.82600	0.08416	0.02237
27	0.09496	0.15812	0.24335	-0.05819	0.66687	-0.11201	0.12386	0.38076

FACTOR ANALYSIS 46 INCIDENTS

ROTATED FACTOR MATRIX

VAR	FACTORS 1	2	3	4	5	6	7	8
1	0.94534	0.16636	-0.30278	-0.18182	-0.01204	-0.05044	0.12491	-0.05053
2	0.04885	-0.16036	-0.17103	0.78327	0.14179	-0.07214	0.09189	-0.17858
3	-0.48892	-0.46959	-0.13369	-0.28921	0.15819	-0.40018	0.29192	-0.03088
4	0.20032	-0.03023	-0.16818	-0.04425	0.28734	-0.00879	-0.04596	0.48206
5	0.07172	-0.27048	-0.04767	-0.12803	-0.09167	0.81765	-0.00719	0.09176
6	0.00538	-0.24285	0.85829	-0.02319	0.00027	-0.01550	-0.11721	-0.00441
7	0.18976	0.75639	-0.24771	-0.14988	-0.23606	-0.19521	-0.16330	-0.09987
8	-0.17321	-0.02160	0.06677	0.84457	-0.01545	-0.07303	0.07629	0.13181
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	-1.05345	-0.11558	-0.23326	0.03249	0.07924	0.16484	-0.15009	0.07362
12	-0.07967	-0.29413	0.10399	-0.12238	-0.00647	-0.29169	0.16403	-0.04056
13	-0.66587	-0.03302	-0.14114	0.68289	-0.00457	-0.07776	-0.45094	0.11821
14	-0.69411	-0.17892	-0.18566	-0.30451	0.07827	-0.13411	0.26954	0.07388
15	-0.42266	0.05131	-0.20157	0.08574	-0.03867	-0.02035	-0.78679	0.06434
16	-0.39640	0.01971	0.04992	0.00693	0.07220	0.66122	0.22673	-0.02926
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.09447	0.00547	0.00744	-0.03581	0.22795	-0.09290	-0.09918	-0.81085
19	0.10516	-0.08836	-0.77292	-0.15231	-0.14903	0.08822	-0.31048	0.07226
20	-0.75046	0.22108	0.19364	0.10420	0.00909	-0.04897	-0.12732	-0.22319
21	0.03762	0.77070	0.08744	-0.09640	0.06268	-0.05965	0.15692	0.00617
22	0.03872	0.05031	-0.15916	-0.01329	-0.80509	-0.03961	0.15917	0.24577
23	0.05436	0.10265	-0.08702	-0.09011	-0.82537	-0.00096	0.03065	-0.05410
24	0.57554	-0.61647	-0.13317	0.13387	0.19053	0.01772	-0.07259	0.01370
25	-0.02059	0.45469	0.60861	-0.13280	0.10251	-0.03731	-0.08371	-0.03744
26	0.06541	0.00582	-0.13587	-0.04791	0.08457	0.42657	0.00868	-0.41398
27	-0.09116	0.43067	-0.16582	0.28745	0.51666	-0.00215	0.35799	0.09708

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 1
ALPHA LEVEL = .10

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	0.	0.0	0.0	0.0	0.0	0.0	0.0
11	0.	0.0	0.0	0.0	0.0	0.0	0.0
12	3.	0.0	3.00	0.0	3.00	0.0	3.00
13	0.	0.30	-0.30	0.60	-0.60	0.90	-0.90
14	1.	0.27	0.73	0.51	0.49	0.72	0.28
15	1.	0.34	0.66	0.63	0.37	0.87	0.13
16	3.	0.41	2.59	0.73	2.27	0.99	2.01
17	2.	0.67	1.33	1.22	0.78	1.67	0.33
18	3.	0.80	2.20	1.43	1.57	1.92	1.08
19	5.	1.02	3.98	1.81	3.19	2.40	2.60
20	6.	1.42	4.58	2.53	3.47	3.38	2.62
21	1.	1.88	-0.88	3.33	-2.33	4.45	-3.45
22	1.	1.79	-0.79	3.01	-2.01	3.78	-2.78
23	6.	1.71	4.29	2.73	3.27	3.22	2.78
24	3.	2.14	0.86	3.49	-0.49	4.26	-1.26
25	3.	2.23	0.77	3.52	-0.52	4.17	-1.17
26	3.	2.30	0.70	3.55	-0.55	4.08	-1.08
27	2.	2.37	-0.37	3.56	-1.56	3.98	-1.98
28	0.	2.34	-2.34	3.37	-3.37	3.59	-3.59
29	1.	2.10	-1.10	2.80	-1.80	2.66	-1.66
30	0.	1.99	-1.99	2.51	-2.51	2.21	-2.21
31	0.	1.79	-1.79	2.06	-2.06	1.54	-1.54
32	1.	1.61	-0.61	1.67	-0.67	1.00	0.00
33	0.	1.55	-1.55	1.55	-1.55	0.87	-0.87

AVERAGE FORECASTING ERROR	0.5820	-0.0671	-0.3183
AVERAGE % FORECASTING ERROR	63.6334	81.0760	80.8225
AVG |FORECASTING ERROR|/INCIDENT	0.8315	0.8540	0.8291
AVG SQUARED FORECASTING ERROR	4.1079	3.8163	3.6612
MAX ABSOLUTE FORECASTING ERROR	4.5812	3.4748	-3.5918

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 1
ALPHA LEVEL = .30

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	0.	1.09	-1.09	0.61	-0.61	-0.63	0.63
11	0.	0.76	-0.76	0.10	-0.10	-0.95	0.95
12	3.	0.53	2.47	-0.15	3.15	-0.93	3.93
13	0.	1.27	-1.27	1.53	-1.53	1.94	-1.94
14	1.	0.89	0.11	0.69	0.31	0.52	0.48
15	1.	0.92	0.08	0.82	0.18	0.79	0.21
16	3.	0.95	2.05	0.89	2.11	0.93	2.07
17	2.	1.56	0.44	2.14	-0.14	2.80	-0.80
18	3.	1.69	1.31	2.23	0.77	2.65	0.35
19	5.	2.09	2.91	2.85	2.15	3.38	1.62
20	6.	2.96	3.04	4.37	1.63	5.38	0.62
21	1.	3.87	-2.87	5.77	-4.77	6.97	-5.97
22	1.	3.01	-2.01	3.48	-2.48	2.88	-1.88
23	6.	2.41	3.59	2.13	3.87	0.97	5.03
24	3.	3.49	-0.49	4.37	-1.37	4.72	-1.72
25	3.	3.34	-0.34	3.81	-0.81	3.65	-0.65
26	3.	3.24	-0.24	3.47	-0.47	3.11	-0.11
27	2.	3.17	-1.17	3.26	-1.26	2.86	-0.86
28	0.	2.82	-2.82	2.53	-2.53	1.88	-1.88
29	1.	1.97	-0.97	0.93	0.07	-0.29	1.29
30	0.	1.68	-1.68	0.66	-0.66	-0.17	0.17
31	0.	1.18	-1.18	-0.04	0.04	-0.82	0.82
32	1.	0.82	0.18	-0.38	1.38	-0.91	1.91
33	0.	0.88	-0.88	0.08	-0.08	0.13	-0.13
AVERAGE FORECASTING ERROR			-0.0657		-0.0480		0.1739
AVERAGE % FORECASTING ERROR			60.5360		72.3067		95.9339
AVG |FORECASTING ERROR|/INCIDENT			0.7539		0.7220		0.8006
AVG SQUARED FORECASTING ERROR			3.0909		3.4208		4.4572
MAX ABSOLUTE FORECASTING ERROR			3.5927		-4.7721		-5.9674

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 1
ALPHA LEVEL = .50

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	0.	0.44	-0.44	-0.55	0.55	-0.40	0.40
11	0.	0.22	-0.22	-0.50	0.50	-0.14	0.14
12	3.	0.11	2.89	-0.36	3.36	0.07	2.93
13	0.	1.55	-1.55	2.77	-2.77	4.66	-4.66
14	1.	0.78	0.22	0.61	0.39	0.17	0.83
15	1.	0.89	0.11	0.91	0.09	0.89	0.11
16	3.	0.94	2.06	1.01	1.99	1.04	1.96
17	2.	1.97	0.03	3.03	-1.03	4.04	-2.04
18	3.	1.99	1.01	2.53	0.47	2.52	0.48
19	5.	2.49	2.51	3.27	1.73	3.50	1.50
20	6.	3.75	2.25	5.39	0.61	6.37	-0.37
21	1.	4.87	-3.87	6.82	-5.82	7.62	-6.62
22	1.	2.94	-1.94	1.97	-0.97	-0.54	1.54
23	6.	1.97	4.03	0.52	5.48	-1.23	7.23
24	3.	3.98	-0.98	5.28	-2.28	7.14	-4.14
25	3.	3.49	-0.49	3.65	-0.65	3.44	-0.44
26	3.	3.25	-0.25	3.08	-0.08	2.65	0.35
27	2.	3.12	-1.12	2.92	-0.92	2.66	-0.66
28	0.	2.56	-2.56	1.90	-1.90	1.31	-1.31
29	1.	1.28	-0.28	-0.33	1.33	-1.57	2.57
30	0.	1.14	-1.14	0.19	-0.19	0.24	-0.24
31	0.	0.57	-0.57	-0.47	0.47	-0.55	0.55
32	1.	0.29	0.71	-0.52	1.52	-0.32	1.32
33	0.	0.64	-0.64	0.60	-0.60	1.46	-1.46
AVERAGE FORECASTING ERROR			-0.0097		0.0540		-0.0023
AVERAGE % FORECASTING ERROR			60.9416		88.1959		112.9873
AVG |FORECASTING ERROR|/INCIDENT			0.7087		0.7930		0.9742
AVG SQUARED FORECASTING ERROR			3.1009		4.4944		7.1094
MAX ABSOLUTE FORECASTING ERROR			4.0317		-5.8216		7.2252

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 1
ALPHA LEVEL = .70

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	0.	0.19	-0.19	-0.28	0.28	0.04	-0.04
11	0.	0.06	-0.06	-0.22	0.22	0.07	-0.07
12	3.	0.02	2.98	-0.11	3.11	0.13	2.87
13	0.	2.11	-2.11	4.16	-4.16	6.40	-6.40
14	1.	0.63	0.37	-0.23	1.23	-2.46	3.46
15	1.	0.89	0.11	0.89	0.11	1.08	-0.08
16	3.	0.97	2.03	1.04	1.96	1.18	1.82
17	2.	2.39	-0.39	3.84	-1.84	5.25	-3.25
18	3.	2.12	0.88	2.28	0.72	1.42	1.58
19	5.	2.74	2.26	3.40	1.60	3.65	1.35
20	6.	4.32	1.68	6.11	-0.11	7.30	-1.30
21	1.	5.50	-4.50	7.21	-6.21	7.49	-6.49
22	1.	2.35	-1.35	-0.29	1.29	-4.55	5.55
23	6.	1.40	4.60	-0.33	6.33	-0.71	6.71
24	3.	4.62	-1.62	7.32	-4.32	11.64	-8.64
25	3.	3.49	-0.49	3.16	-0.16	1.43	1.57
26	3.	3.15	-0.15	2.71	0.29	2.08	0.92
27	2.	3.04	-1.04	2.81	-0.81	2.83	-0.83
28	0.	2.31	-2.31	1.51	-1.51	0.95	-0.95
29	1.	0.69	0.31	-1.17	2.17	-2.39	3.39
30	0.	0.91	-0.91	0.56	-0.56	1.71	-1.71
31	0.	0.27	-0.27	-0.47	0.47	-0.52	0.52
32	1.	0.08	0.92	-0.33	1.33	-0.02	1.02
33	0.	0.72	-0.72	1.24	-1.24	2.27	-2.27
AVERAGE FORECASTING ERROR			0.0015		0.0072		-0.0527
AVERAGE % FORECASTING ERROR			64.6999		106.9222		160.8391
AVG |FORECASTING ERROR|/INCIDENT			0.7166		0.9334		1.3951
AVG SQUARED FORECASTING ERROR			3.3905		6.2225		12.4715
MAX ABSOLUTE FORECASTING ERROR			4.5953		6.3297		-8.6351

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 1
ALPHA LEVEL = .90

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	0.	0.07	-0.07	-0.42	0.42	-1.56	1.56
11	0.	0.01	-0.01	-0.11	0.11	0.16	-0.16
12	3.	0.00	3.00	-0.02	3.02	0.11	2.89
13	0.	2.70	-2.70	5.40	-5.40	8.13	-8.13
14	1.	0.27	0.73	-1.89	2.89	-6.48	7.48
15	1.	0.93	0.07	1.37	-0.37	3.51	-2.51
16	3.	0.99	2.01	1.10	1.90	0.99	2.01
17	2.	2.80	-0.80	4.62	-2.62	6.31	-4.31
18	3.	2.08	0.92	1.54	1.46	-0.64	3.64
19	5.	2.91	2.09	3.68	1.32	4.78	0.22
20	6.	4.79	1.21	6.75	-0.75	8.05	-2.05
21	1.	5.88	-4.88	7.16	-6.16	6.62	-5.62
22	1.	1.49	-0.49	-2.77	3.77	-8.38	9.38
23	6.	1.05	4.95	0.18	5.82	3.02	2.98
24	3.	5.50	-2.50	9.87	-6.87	15.39	-12.39
25	3.	3.25	-0.25	1.43	1.57	-4.20	7.20
26	3.	3.03	-0.03	2.62	0.38	3.46	-0.46
27	2.	3.00	-1.00	2.94	-0.94	3.37	-1.37
28	0.	2.10	-2.10	1.19	-1.19	0.39	-0.39
29	1.	0.21	0.79	-1.77	2.77	-2.92	3.92
30	0.	0.92	-0.92	1.43	-1.43	3.81	-3.81
31	0.	0.09	-0.09	-0.69	0.69	-1.74	1.74
32	1.	0.01	0.99	-0.15	1.15	0.36	0.64
33	0.	0.90	-0.90	1.78	-1.78	2.86	-2.86
AVERAGE FORECASTING ERROR			0.0008		-0.0105		-0.0166
AVERAGE % FORECASTING ERROR			71.9618		139.5391		220.5838
AVG |FORECASTING ERROR|/INCIDENT			0.7446		1.2172		1.9496
AVG SQUARED FORECASTING ERROR			3.8237		8.9462		23.2017
MAX ABSOLUTE FORECASTING ERROR			4.9512		-6.8744		-12.3937

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 2
ALPHA LEVEL = .10

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	3.	1.60	1.40	1.76	1.24	1.71	1.29
11	1.	1.74	-0.74	2.02	-1.02	2.10	-1.10
12	2.	1.67	0.33	1.84	0.16	1.81	0.19
13	0.	1.70	-1.70	1.89	-1.89	1.88	-1.88
14	1.	1.53	-0.53	1.53	-0.53	1.33	-0.33
15	16.	1.48	14.52	1.43	14.57	1.19	14.81
16	7.	2.93	4.07	4.34	2.66	5.58	1.42
17	3.	3.34	-0.34	5.01	-2.01	6.40	-3.40
18	5.	3.30	1.70	4.78	0.22	5.82	-0.82
19	1.	3.47	-2.47	4.97	-3.97	5.93	-4.93
20	13.	3.22	9.78	4.32	8.68	4.80	8.20
21	5.	4.20	0.80	6.17	-1.17	7.46	-2.46
22	5.	4.28	0.72	6.13	-1.13	7.18	-2.18
23	3.	4.35	-1.35	6.09	-3.09	6.92	-3.92
24	0.	4.22	-4.22	5.65	-5.65	6.08	-6.08
25	6.	3.80	2.20	4.66	1.34	4.49	1.51
26	2.	4.02	-2.02	5.01	-3.01	4.99	-2.99
27	0.	3.82	-3.82	4.51	-4.51	4.19	-4.19
28	1.	3.43	-2.43	3.68	-2.68	2.94	-1.94
29	5.	3.19	1.81	3.17	1.83	2.23	2.77
30	0.	3.37	-3.37	3.53	-3.53	2.88	-2.88
31	0.	3.03	-3.03	2.84	-2.84	1.90	-1.90
32	0.	2.73	-2.73	2.25	-2.25	1.12	-1.12
33	0.	2.46	-2.46	1.76	-1.76	0.51	-0.51
AVERAGE FORECASTING ERROR			0.2550		-0.4307		-0.5192
AVERAGE % FORECASTING ERROR			62.7848		79.3136		89.7269
AVG |FORECASTING ERROR|/INCIDENT			0.8676		0.9083		0.9219
AVG SQUARED FORECASTING ERROR			17.7283		18.1492		18.6855
MAX ABSOLUTE FORECASTING ERROR			14.5235		14.5726		14.8060

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 2
ALPHA LEVEL = .30

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	3.	2.02	0.98	0.95	2.05	-0.66	3.66
11	1.	2.31	-1.31	1.86	-0.86	1.35	-0.35
12	2.	1.92	0.08	1.21	0.79	0.59	1.41
13	0.	1.94	-1.94	1.47	-1.47	1.28	-1.28
14	1.	1.36	-0.36	0.45	0.55	-0.13	1.13
15	16.	1.25	14.75	0.50	15.50	0.27	15.73
16	7.	5.68	1.32	9.58	-2.58	14.06	-7.06
17	3.	6.07	-3.07	9.20	-6.20	11.57	-8.57
18	5.	5.15	-0.15	6.42	-1.42	6.21	-1.21
19	1.	5.11	-4.11	5.95	-4.95	5.38	-4.38
20	13.	3.87	9.13	3.23	9.77	1.35	11.65
21	5.	6.61	-1.61	8.90	-3.90	10.51	-5.51
22	5.	6.13	-1.13	7.25	-2.25	7.21	-2.21
23	3.	5.79	-2.79	6.23	-3.23	5.53	-2.53
24	0.	4.95	-4.95	4.43	-4.43	2.96	-2.96
25	6.	3.47	2.53	1.61	4.39	-0.74	6.74
26	2.	4.23	-2.23	3.69	-1.69	3.36	-1.36
27	0.	3.56	-3.56	2.51	-2.51	1.78	-1.78
28	1.	2.49	-1.49	0.69	0.31	-0.58	1.58
29	5.	2.04	2.96	0.34	4.66	-0.46	5.46
30	0.	2.93	-2.93	2.62	-2.62	3.46	-3.46
31	0.	2.05	-2.05	0.96	-0.96	0.76	-0.76
32	0.	1.44	-1.44	0.05	-0.05	-0.37	0.37
33	0.	1.01	-1.01	-0.39	0.39	-0.71	0.71
AVERAGE FORECASTING ERROR			-0.1829		-0.0292		0.2090
AVERAGE % FORECASTING ERROR			77.3325		96.0479		113.4270
AVG |FORECASTING ERROR|/INCIDENT			0.8592		0.9814		1.1627
AVG SQUARED FORECASTING ERROR			17.6045		21.8205		28.8289
MAX ABSOLUTE FORECASTING ERROR			14.7474		15.4966		15.7331

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 2
ALPHA LEVEL = .50

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	3.	1.00	2.00	0.02	2.98	0.69	2.31
11	1.	2.00	-1.00	2.51	-1.51	4.33	-3.33
12	2.	1.50	0.50	1.25	0.75	1.41	0.59
13	0.	1.75	-1.75	1.88	-1.88	2.33	-2.33
14	1.	0.88	0.12	0.06	0.94	-0.65	1.65
15	16.	0.94	15.06	0.59	15.41	0.71	15.29
16	7.	8.47	-1.47	15.83	-8.83	23.59	-16.59
17	3.	7.73	-4.73	10.68	-7.68	10.15	-7.15
18	5.	5.37	-0.37	4.47	0.53	0.37	4.63
19	1.	5.18	-4.18	4.55	-3.55	2.76	-1.76
20	13.	3.09	9.91	0.68	12.32	-1.99	14.99
21	5.	8.05	-3.05	11.80	-6.80	16.62	-11.62
22	5.	6.52	-1.52	6.88	-1.88	5.89	-0.89
23	3.	5.76	-2.76	5.18	-2.18	3.74	-0.74
24	0.	4.38	-4.38	2.71	-2.71	0.90	-0.90
25	6.	2.19	3.81	-0.84	6.84	-3.09	9.09
26	2.	4.10	-2.10	4.49	-2.49	6.78	-4.78
27	0.	3.05	-3.05	2.20	-2.20	2.10	-2.10
28	1.	1.52	-0.52	-0.43	1.43	-1.57	2.57
29	5.	1.26	3.74	0.03	4.97	0.16	4.84
30	0.	3.13	-3.13	4.38	-4.38	6.94	-6.94
31	0.	1.57	-1.57	0.63	-0.63	-0.29	0.29
32	0.	0.78	-0.78	-0.47	0.47	-1.24	1.24
33	0.	0.39	-0.39	-0.63	0.63	-0.78	0.78

AVERAGE FORECASTING ERROR	-0.0672	0.0231	-0.0358
AVERAGE % FORECASTING ERROR	82.4442	111.6098	135.7897
AVG |FORECASTING ERROR|/INCIDENT	0.9100	1.1890	1.4860
AVG SQUARED FORECASTING ERROR	19.5603	30.0598	48.4007
MAX ABSOLUTE FORECASTING ERROR	15.0624	15.4060	-16.5872

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 2
ALPHA LEVEL = .70

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	3.	0.82	2.18	0.73	2.27	2.22	0.78
11	1.	2.35	-1.35	3.85	-2.85	5.88	-4.88
12	2.	1.40	0.60	0.91	1.09	-0.47	2.47
13	0.	1.82	-1.82	2.09	-2.09	2.44	-2.44
14	1.	0.55	0.45	-0.65	1.65	-2.01	3.01
15	16.	0.86	15.14	0.82	15.18	1.57	14.43
16	7.	11.46	-4.46	22.04	-15.04	32.89	-25.89
17	3.	8.34	-5.34	8.39	-5.39	1.12	1.88
18	5.	4.60	0.40	0.88	4.12	-5.08	10.08
19	1.	4.88	-3.88	4.04	-3.04	5.14	-4.14
20	13.	2.16	10.84	-0.80	13.80	-2.60	15.60
21	5.	9.75	-4.75	16.44	-11.44	25.57	-20.57
22	5.	6.42	-1.42	5.11	-0.11	-0.17	5.17
23	3.	5.43	-2.43	4.04	-1.04	2.38	0.62
24	0.	3.73	-3.73	1.61	-1.61	0.39	-0.39
25	6.	1.12	4.88	-2.13	8.13	-3.62	9.62
26	2.	4.54	-2.54	6.98	-4.98	12.22	-10.22
27	0.	2.76	-2.76	1.72	-1.72	-0.19	0.19
28	1.	0.83	0.17	-1.42	2.42	-3.19	4.19
29	5.	0.95	4.05	0.40	4.60	1.55	3.45
30	0.	3.78	-3.78	6.45	-6.45	10.03	-10.03
31	0.	1.14	-1.14	-0.71	0.71	-4.16	4.16
32	0.	0.34	-0.34	-1.01	1.01	-1.54	1.54
33	0.	0.10	-0.10	-0.54	0.54	0.00	-0.00
AVERAGE FORECASTING ERROR			-0.0468		-0.0108		-0.0564
AVERAGE % FORECASTING ERROR			90.4348		135.4885		200.9437
AVG |FORECASTING ERROR|/INCIDENT			0.9942		1.4086		1.9715
AVG SQUARED FORECASTING ERROR			22.2916		42.6206		86.9431
MAX ABSOLUTE FORECASTING ERROR			15.1361		15.1766		-25.8894

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 2
ALPHA LEVEL = .90

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	3.	0.91	2.09	1.53	1.47	4.56	-1.56
11	1.	2.79	-1.79	4.73	-3.73	6.36	-5.36
12	2.	1.18	0.82	-0.24	2.24	-3.44	5.44
13	0.	1.92	-1.92	2.51	-2.51	4.21	-4.21
14	1.	0.19	0.81	-1.47	2.47	-3.57	4.57
15	16.	0.92	15.08	1.48	14.52	3.50	12.50
16	7.	14.49	-7.49	28.12	-21.12	41.39	-34.39
17	3.	7.75	-4.75	2.37	0.63	-15.31	18.31
18	5.	3.47	1.53	-1.34	6.34	-2.54	7.54
19	1.	4.85	-3.85	5.74	-4.74	11.32	-10.32
20	13.	1.38	11.62	-1.99	14.99	-5.70	18.70
21	5.	11.84	-6.84	21.95	-16.95	35.07	-30.07
22	5.	5.68	-0.68	0.54	4.46	-13.41	18.41
23	3.	5.07	-2.07	3.94	-0.94	6.56	-3.56
24	0.	3.21	-3.21	1.23	-1.23	0.65	-0.65
25	6.	0.32	5.68	-2.76	8.76	-3.93	9.93
26	2.	5.43	-3.43	10.24	-8.24	18.01	-16.01
27	0.	2.34	-2.34	-0.27	0.27	-6.90	6.90
28	1.	0.23	0.77	-2.14	3.14	-2.56	3.56
29	5.	0.92	4.08	1.38	3.62	4.16	0.84
30	0.	4.59	-4.59	8.31	-8.31	11.85	-11.85
31	0.	0.46	-0.46	-3.30	3.30	-10.42	10.42
32	0.	0.05	-0.05	-0.74	0.74	1.52	-1.52
33	0.	0.00	-0.00	-0.12	0.12	0.78	-0.78
AVERAGE FORECASTING ERROR			-0.0421		-0.0292		-0.1315
AVERAGE % FORECASTING ERROR			103.5951		173.3180		312.8735
AVG |FORECASTING ERROR|/INCIDENT			1.0878		1.7069		3.0051
AVG SQUARED FORECASTING ERROR			25.8568		64.0013		175.4474
MAX ABSOLUTE FORECASTING ERROR			15.0808		-21.1207		-34.3905

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 3
ALPHA LEVEL = .10

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	10.	12.40	-2.40	10.69	-0.69	6.80	3.20
11	4.	12.16	-8.16	10.38	-6.38	6.81	-2.81
12	6.	11.34	-5.34	8.93	-2.93	5.07	0.93
13	2.	10.81	-8.81	8.10	-6.10	4.34	-2.34
14	3.	9.93	-6.93	6.61	-3.61	2.61	0.39
15	5.	9.24	-4.24	5.55	-0.55	1.60	3.40
16	6.	8.81	-2.81	5.08	0.92	1.46	4.54
17	1.	8.53	-7.53	4.89	-3.89	1.73	-0.73
18	3.	7.78	-4.78	3.74	-0.74	0.51	2.49
19	1.	7.30	-6.30	3.19	-2.19	0.21	0.79
20	5.	6.67	-1.67	2.34	2.66	-0.56	5.56
21	0.	6.50	-6.50	2.44	-2.44	0.09	-0.09
22	0.	5.85	-5.85	1.55	-1.55	-0.81	0.81
23	2.	5.27	-3.27	0.81	1.19	-1.47	3.47
24	5.	4.94	0.06	0.60	4.40	-1.33	6.33
25	6.	4.95	1.05	1.05	4.95	-0.25	6.25
26	2.	5.05	-3.05	1.65	0.35	0.97	1.03
27	8.	4.75	3.25	1.38	6.62	0.81	7.19
28	1.	5.07	-4.07	2.36	-1.36	2.51	-1.51
29	11.	4.66	6.34	1.82	9.18	1.82	9.18
30	12.	5.30	6.70	3.37	8.63	4.29	7.71
31	5.	5.97	-0.97	4.91	0.09	6.59	-1.59
32	6.	5.87	0.13	4.82	1.18	6.35	-0.35
33	4.	5.88	-1.88	4.95	-0.95	6.44	-2.44
AVERAGE FORECASTING ERROR			-2.7933		0.2835		2.1423
AVERAGE % FORECASTING ERROR			155.3046		88.6164		79.2896
AVG |FORECASTING ERROR|/INCIDENT			0.9454		0.6812		0.6957
AVG SQUARED FORECASTING ERROR			24.5315		16.2161		16.4342
MAX ABSOLUTE FORECASTING ERROR			-8.8096		9.1792		9.1811

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 3
ALPHA LEVEL = .30

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	10.	7.12	2.88	7.51	2.49	10.84	-0.84
11	4.	7.98	-3.98	9.12	-5.12	12.20	-8.20
12	6.	6.79	-0.79	6.39	-0.39	7.01	-1.01
13	2.	6.55	-4.55	6.04	-4.04	6.35	-4.35
14	3.	5.19	-2.19	3.46	-0.46	2.47	0.53
15	5.	4.53	0.47	2.67	2.33	1.83	3.17
16	6.	4.67	1.33	3.51	2.49	3.62	2.38
17	1.	5.07	-4.07	4.65	-3.65	5.48	-4.48
18	3.	3.85	-0.85	2.34	0.66	1.82	1.18
19	1.	3.59	-2.59	2.28	-1.28	2.12	-1.12
20	5.	2.82	2.18	1.12	3.88	0.62	4.38
21	0.	3.47	-3.47	2.94	-2.94	3.75	-3.75
22	0.	2.43	-2.43	1.02	-1.02	0.71	-0.71
23	2.	1.70	0.30	-0.02	2.02	-0.54	2.54
24	5.	1.79	3.21	0.68	4.32	0.92	4.08
25	6.	2.75	3.25	2.94	3.06	4.40	1.60
26	2.	3.73	-1.73	4.83	-2.83	6.77	-4.77
27	8.	3.21	4.79	3.46	4.54	3.97	4.03
28	1.	4.65	-3.65	6.26	-5.26	7.98	-6.98
29	11.	3.55	7.45	3.59	7.41	3.21	7.79
30	12.	5.79	6.21	8.05	3.95	10.01	1.99
31	5.	7.65	-2.65	11.10	-6.10	13.66	-8.66
32	6.	6.86	-0.86	8.47	-2.47	8.43	-2.43
33	4.	6.60	-2.60	7.47	-3.47	6.71	-2.71
AVERAGE FORECASTING ERROR			-0.1805		-0.0777		-0.6811
AVERAGE % FORECASTING ERROR			91.4655		105.2655		125.8984
AVG |FORECASTING ERROR|/INCIDENT			0.6340		0.7055		0.7746
AVG SQUARED FORECASTING ERROR			11.1565		13.1348		17.7671
MAX ABSOLUTE FORECASTING ERROR			7.4475		7.4112		-8.6554

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 3
ALPHA LEVEL = .50

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	10.	8.30	1.70	10.61	-0.61	10.95	-0.95
11	4.	9.15	-5.15	11.16	-7.16	11.02	-7.02
12	6.	6.57	-0.57	5.00	1.00	1.36	4.64
13	2.	6.29	-4.29	5.21	-3.21	3.89	-1.89
14	3.	4.14	-1.14	1.46	1.54	-0.81	3.81
15	5.	3.57	1.43	1.66	3.34	1.29	3.71
16	6.	4.29	1.71	4.04	1.96	5.53	0.47
17	1.	5.14	-4.14	5.88	-4.88	7.60	-6.60
18	3.	3.07	-0.07	1.37	1.63	-0.21	3.21
19	1.	3.04	-2.04	2.15	-1.15	2.17	-1.17
20	5.	2.02	2.98	0.56	4.44	-0.00	5.00
21	0.	3.51	-3.51	4.27	-4.27	6.21	-6.21
22	0.	1.75	-1.75	0.38	-0.38	-0.78	0.78
23	2.	0.88	1.12	-0.69	2.69	-1.46	3.46
24	5.	1.44	3.56	1.22	3.78	2.18	2.82
25	6.	3.22	2.78	4.89	1.11	7.26	-1.26
26	2.	4.61	-2.61	6.84	-4.84	8.58	-6.58
27	8.	3.30	4.70	3.11	4.89	1.57	6.43
28	1.	5.65	-4.65	7.90	-6.90	9.57	-8.57
29	11.	3.33	7.67	2.13	8.87	-0.49	11.49
30	12.	7.16	4.84	10.40	1.60	13.53	-1.53
31	5.	9.58	-4.58	13.62	-8.62	15.98	-10.98
32	6.	7.29	-1.29	7.02	-1.02	3.89	2.11
33	4.	6.65	-2.65	5.86	-1.86	3.79	0.21
AVERAGE FORECASTING ERROR			-0.2481		-0.3356		-0.1920
AVERAGE % FORECASTING ERROR			99.2336		124.5181		151.8614
AVG |FORECASTING ERROR|/INCIDENT			0.6569		0.7569		0.9344
AVG SQUARED FORECASTING ERROR			11.8383		17.6646		27.5999
MAX ABSOLUTE FORECASTING ERROR			7.6738		8.8742		11.4913

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 3
ALPHA LEVEL = .70

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	10.	8.99	1.01	10.95	-0.95	12.48	-2.48
11	4.	9.70	-5.70	10.99	-6.99	10.78	-6.78
12	6.	5.71	0.29	2.11	3.89	-2.85	8.85
13	2.	5.91	-3.91	5.04	-3.04	6.27	-4.27
14	3.	3.17	-0.17	0.17	2.83	-1.58	4.58
15	5.	3.05	1.95	2.03	2.97	3.48	1.52
16	6.	4.42	1.58	5.47	0.53	7.99	-1.99
17	1.	5.52	-4.52	6.95	-5.95	8.07	-7.07
18	3.	2.36	0.64	-0.38	3.38	-4.21	7.21
19	1.	2.81	-1.81	2.44	-1.44	3.65	-2.65
20	5.	1.54	3.46	0.17	4.83	-0.47	5.47
21	0.	3.96	-3.96	5.97	-5.97	9.16	-9.16
22	0.	1.19	-1.19	-0.98	0.98	-4.20	4.20
23	2.	0.36	1.64	-1.13	3.13	-1.41	3.41
24	5.	1.51	3.49	2.21	2.79	4.32	0.68
25	6.	3.95	2.05	6.61	-0.61	9.19	-3.19
26	2.	5.39	-3.39	7.62	-5.62	7.96	-5.96
27	8.	3.02	4.98	1.31	6.69	-2.51	10.51
28	1.	6.50	-5.50	9.48	-8.48	13.02	-12.02
29	11.	2.65	8.35	-0.31	11.31	-5.19	16.19
30	12.	8.50	3.50	13.45	-1.45	19.90	-7.90
31	5.	10.95	-5.95	14.89	-9.89	15.81	-10.81
32	6.	6.78	-0.78	3.80	2.20	-2.84	8.84
33	4.	6.24	-2.24	4.79	-0.79	4.34	-0.34
AVERAGE FORECASTING ERROR			-0.2573		-0.2354		-0.1324
AVERAGE % FORECASTING ERROR			106.1453		146.2016		198.6082
AVG |FORECASTING ERROR|/INCIDENT			0.6674		0.8953		1.3528
AVG SQUARED FORECASTING ERROR			13.2132		24.9774		52.0393
MAX ABSCLUTE FORECASTING ERROR			8.3486		11.3082		16.1871

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 3
ALPHA LEVEL = .90

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	10.	9.62	0.38	12.58	-2.58	19.45	-9.45
11	4.	9.96	-5.96	10.60	-6.60	8.96	-4.96
12	6.	4.60	1.40	-0.71	6.71	-6.81	12.81
13	2.	5.86	-3.86	6.59	-4.59	12.02	-10.02
14	3.	2.39	0.61	-1.01	4.01	-4.61	7.61
15	5.	2.94	2.06	3.15	1.85	6.41	-1.41
16	6.	4.79	1.21	6.67	-0.67	8.66	-2.66
17	1.	5.88	-4.88	7.15	-6.15	6.75	-5.75
18	3.	1.49	1.51	-2.78	5.78	-8.35	11.35
19	1.	2.85	-1.85	3.78	-2.78	8.42	-7.42
20	5.	1.18	3.82	-0.39	5.39	-2.43	7.43
21	0.	4.62	-4.62	7.90	-7.90	12.54	-12.54
22	0.	0.46	-0.46	-3.37	3.37	-10.01	10.01
23	2.	0.05	1.95	-0.75	2.75	1.61	0.39
24	5.	1.80	3.20	3.48	1.52	6.20	-1.20
25	6.	4.68	1.32	7.72	-1.72	9.36	-3.36
26	2.	5.87	-3.87	7.36	-5.36	5.97	-3.97
27	8.	2.39	5.61	-0.95	8.95	-5.91	13.91
28	1.	7.44	-6.44	12.16	-11.16	19.71	-18.71
29	11.	1.64	9.36	-3.68	14.68	-12.97	23.97
30	12.	10.06	1.94	17.95	-5.95	30.23	-18.23
31	5.	11.81	-6.81	14.34	-9.34	10.21	-5.21
32	6.	5.68	0.32	-0.19	6.19	-9.01	15.01
33	4.	5.97	-1.97	5.67	-1.67	10.36	-6.36
AVERAGE FORECASTING ERROR			-0.2512		-0.2202		-0.3660
AVERAGE % FORECASTING ERROR			116.0828		180.4279		276.0923
AVG |FORECASTING ERROR|/INCIDENT			0.6981		1.1820		1.9789
AVG SQUARED FORECASTING ERROR			15.3972		39.2981		114.4510
MAX ABSOLUTE FORECASTING ERROR			9.3561		14.6791		23.9657

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 4
ALPHA LEVEL = .10

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	4.	7.80	-3.80	8.60	-4.60	7.67	-3.67
11	14.	7.42	6.58	7.76	6.24	6.46	7.54
12	10.	8.08	1.92	9.04	0.96	8.50	1.50
13	9.	8.27	0.73	9.33	-0.33	8.94	0.06
14	0.	8.34	-8.34	9.37	-9.37	8.98	-8.98
15	0.	7.51	-7.51	7.60	-7.60	6.31	-6.31
16	0.	6.76	-6.76	6.09	-6.09	4.17	-4.17
17	0.	6.08	-6.08	4.80	-4.80	2.47	-2.47
18	0.	5.47	-5.47	3.71	-3.71	1.13	-1.13
19	0.	4.93	-4.93	2.80	-2.80	0.10	-0.10
20	0.	4.43	-4.43	2.02	-2.02	-0.68	0.68
21	7.	3.99	3.01	1.38	5.62	-1.26	8.26
22	4.	4.29	-0.29	2.24	1.76	0.43	3.57
23	1.	4.26	-3.26	2.39	-1.39	0.93	0.07
24	3.	3.94	-0.94	1.92	1.08	0.48	2.52
25	9.	3.84	5.16	1.94	7.06	0.74	8.26
26	9.	4.36	4.64	3.16	5.84	2.79	6.21
27	7.	4.82	2.18	4.21	2.79	4.46	2.54
28	26.	5.04	20.96	4.70	21.30	5.21	20.79
29	27.	7.14	19.86	8.93	18.07	11.52	15.48
30	13.	9.12	3.88	12.72	0.28	16.86	-3.86
31	16.	9.51	6.49	13.14	2.86	16.89	-0.89
32	10.	10.16	-0.16	14.07	-4.07	17.73	-7.73
33	12.	10.14	1.86	13.65	-1.65	16.54	-4.54
AVERAGE FORECASTING ERROR			1.0538		1.0592		1.4004
AVERAGE % FORECASTING ERROR			42.3096		37.6697		39.5270
AVG |FORECASTING ERROR|/INCIDENT			0.7140		0.6757		0.6704
AVG SQUARED FORECASTING ERROR			54.6904		51.2383		49.4534
MAX ABSOLUTE FORECASTING ERROR			20.9598		21.2957		20.7892

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 4
ALPHA LEVEL = .30

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	4.	9.80	-5.80	12.61	-8.61	14.26	-10.26
11	14.	8.06	5.94	8.29	5.71	6.86	7.14
12	10.	9.84	0.16	11.78	-1.78	12.49	-2.49
13	9.	9.89	-0.89	11.30	-2.30	11.26	-2.26
14	0.	9.62	-9.62	10.34	-10.34	9.62	-9.62
15	0.	6.74	-6.74	4.35	-4.35	0.75	-0.75
16	0.	4.72	-4.72	1.03	-1.03	-2.80	2.80
17	0.	3.30	-3.30	-0.70	0.70	-3.68	3.68
18	0.	2.31	-2.31	-1.48	1.48	-3.36	3.36
19	0.	1.62	-1.62	-1.73	1.73	-2.60	2.60
20	0.	1.13	-1.13	-1.69	1.69	-1.79	1.79
21	7.	0.79	6.21	-1.53	8.53	-1.08	8.08
22	4.	2.65	1.35	2.89	1.11	5.76	-1.76
23	1.	3.06	-2.06	3.63	-2.63	5.97	-4.97
24	3.	2.44	0.56	2.22	0.78	3.07	-0.07
25	9.	2.61	6.39	2.62	6.38	3.45	5.55
26	9.	4.53	4.47	6.45	2.55	8.95	0.05
27	7.	5.87	1.13	8.56	-1.56	11.07	-4.07
28	26.	6.21	19.79	8.43	17.57	9.72	16.28
29	27.	12.15	14.85	19.64	7.36	25.81	1.19
30	13.	16.60	-3.60	26.30	-13.30	32.83	-19.83
31	16.	15.52	0.48	21.23	-5.23	21.81	-5.81
32	10.	15.66	-5.66	19.81	-9.81	18.64	-8.64
33	12.	13.97	-1.97	15.16	-3.16	11.41	0.59
AVERAGE FORECASTING ERROR			0.4966		-0.3560		-0.7255
AVERAGE % FORECASTING ERROR			41.1093		58.0056		69.1467
AVG |FORECASTING ERROR|/INCIDENT			0.6119		0.6612		0.6832
AVG SQUARED FORECASTING ERROR			42.4440		43.9620		50.5217
MAX ABSOLUTE FORECASTING ERROR			19.7923		17.5683		-19.8324

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 4
ALPHA LEVEL = .50

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	4.	11.48	-7.48	9.84	-5.84	2.84	1.16
11	14.	7.74	6.26	3.18	10.82	-3.24	17.24
12	10.	10.87	-0.87	11.72	-1.72	13.92	-3.92
13	9.	10.44	-1.44	10.42	-1.42	10.66	-1.66
14	0.	9.72	-9.72	8.99	-8.99	8.40	-8.40
15	0.	4.86	-4.86	-0.36	0.36	-5.15	5.15
16	0.	2.43	-2.43	-2.61	2.61	-4.83	4.83
17	0.	1.21	-1.21	-2.52	2.52	-2.32	2.32
18	0.	0.61	-0.61	-1.87	1.87	-0.51	0.51
19	0.	0.30	-0.30	-1.24	1.24	0.38	-0.38
20	0.	0.15	-0.15	-0.77	0.77	0.65	-0.65
21	7.	0.08	6.92	-0.46	7.46	0.64	6.36
22	4.	3.54	0.46	6.73	-2.73	11.01	-7.01
23	1.	3.77	-2.77	5.60	-4.60	6.37	-5.37
24	3.	2.38	0.62	1.91	1.09	0.00	3.00
25	9.	2.69	6.31	2.76	6.24	2.35	6.65
26	9.	5.85	3.15	9.04	-0.04	11.95	-2.95
27	7.	7.42	-0.42	10.60	-3.60	12.03	-5.03
28	26.	7.21	18.79	8.59	17.41	7.51	18.49
29	27.	16.61	10.39	26.69	0.31	34.85	-7.85
30	13.	21.80	-8.80	32.04	-19.04	36.28	-23.28
31	16.	17.40	-1.40	18.12	-2.12	10.72	5.28
32	10.	16.70	-6.70	16.36	-6.36	11.60	-1.60
33	12.	13.35	-1.35	9.83	2.17	4.27	7.73
AVERAGE FORECASTING ERROR			0.0994		-0.0661		0.4425
AVERAGE % FORECASTING ERROR			48.0254		61.1819		75.5762
AVG |FORECASTING ERROR|/INCIDENT			0.5714		0.6150		0.8113
AVG SQUARED FORECASTING ERROR			38.2176		46.1985		70.2115
MAX ABSOLUTE FORECASTING ERROR			18.7885		-19.0407		-23.2809

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 4
ALPHA LEVEL = .70

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	4.	10.31	-6.31	5.50	-1.50	1.93	2.07
11	14.	5.89	8.11	0.04	13.96	-2.08	16.08
12	10.	11.57	-1.57	15.49	-5.49	24.63	-14.63
13	9.	10.47	-1.47	10.55	-1.55	9.45	-0.45
14	0.	9.44	-9.44	8.44	-8.44	7.02	-7.02
15	0.	2.83	-2.83	-4.08	4.08	-10.41	10.41
16	0.	0.85	-0.85	-3.21	3.21	-2.25	2.25
17	0.	0.25	-0.25	-1.56	1.56	0.97	-0.97
18	0.	0.08	-0.08	-0.65	0.65	1.20	-1.20
19	0.	0.02	-0.02	-0.25	0.25	0.76	-0.76
20	0.	0.01	-0.01	-0.09	0.09	0.38	-0.38
21	7.	0.00	7.00	-0.03	7.03	0.17	6.83
22	4.	4.90	-0.90	9.79	-5.79	14.77	-10.77
23	1.	4.27	-3.27	5.11	-4.11	2.55	-1.55
24	3.	1.98	1.02	-0.06	3.06	-3.70	6.70
25	9.	2.69	6.31	2.80	6.20	3.84	5.16
26	9.	7.11	1.89	11.55	-2.55	16.21	-7.21
27	7.	8.43	-1.43	11.09	-4.09	10.70	-3.70
28	26.	7.43	18.57	7.22	18.78	4.24	21.76
29	27.	20.43	6.57	33.37	-6.37	45.62	-18.62
30	13.	25.03	-12.03	33.51	-20.51	32.73	-19.73
31	16.	16.61	-0.61	10.73	5.27	-3.86	19.86
32	10.	16.18	-6.18	13.99	-3.99	13.30	-3.30
33	12.	11.85	0.15	6.87	5.13	3.87	8.13
AVERAGE FORECASTING ERROR			0.0983		0.2031		0.3726
AVERAGE % FORECASTING ERROR			50.5021		67.1819		75.7279
AVG |FORECASTING ERROR|/INCIDENT			0.5351		0.7383		1.0472
AVG SQUARED FORECASTING ERROR			36.9297		57.7221		109.3962
MAX ABSOLUTE FORECASTING ERROR			18.5703		-20.5097		21.7557

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 4
ALPHA LEVEL = .90

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	4.	9.29	-5.29	5.22	-1.22	13.41	-9.41
11	14.	4.53	9.47	-0.63	14.63	-0.92	14.92
12	10.	13.05	-3.05	21.06	-11.06	34.20	-24.20
13	9.	10.31	-1.31	8.36	0.64	-0.28	9.28
14	0.	9.13	-9.13	7.76	-7.76	7.47	-7.47
15	0.	0.91	-0.91	-7.44	7.44	-14.46	14.46
16	0.	0.09	-0.09	-1.57	1.57	4.43	-4.43
17	0.	0.01	-0.01	-0.24	0.24	1.77	-1.77
18	0.	0.00	-0.00	-0.03	0.03	0.38	-0.38
19	0.	0.00	-0.00	-0.00	0.00	0.07	-0.07
20	0.	0.00	-0.00	-0.00	0.00	0.01	-0.01
21	7.	0.00	7.00	-0.00	7.00	0.00	7.00
22	4.	6.30	-2.30	12.60	-8.60	18.90	-14.90
23	1.	4.23	-3.23	2.79	-1.79	-4.32	5.32
24	3.	1.32	1.68	-1.73	4.73	-4.05	7.05
25	9.	2.83	6.17	4.04	4.96	8.06	0.94
26	9.	8.38	0.62	14.05	-5.05	18.92	-9.92
27	7.	8.94	-1.94	10.06	-3.06	6.00	1.00
28	26.	7.19	18.81	5.56	20.44	2.40	23.60
29	27.	24.12	2.88	40.88	-13.88	58.96	-31.96
30	13.	26.71	-13.71	30.98	-17.98	20.29	-7.29
31	16.	14.37	1.63	2.46	13.54	-14.80	30.80
32	10.	15.84	-5.84	16.11	-6.11	26.57	-16.57
33	12.	10.58	1.42	5.36	6.64	0.90	11.10
AVERAGE FORECASTING ERROR			0.1191		0.2230		-0.1224
AVERAGE % FORECASTING ERROR			52.2768		65.7819		145.8071
AVG |FORECASTING ERROR|/INCIDENT			0.5330		0.8751		1.4025
AVG SQUARED FORECASTING ERROR			37.9711		77.6344		195.7428
MAX ABSOLUTE FORECASTING ERROR			18.8062		20.4384		-31.9591

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 5
ALPHA LEVEL = .10

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	23.	33.80	-10.80	36.93	-13.93	41.63	-18.63
11	27.	32.72	-5.72	34.46	-7.46	37.29	-10.29
12	10.	32.15	-22.15	33.14	-23.14	34.95	-24.95
13	14.	29.93	-15.93	28.61	-14.61	27.92	-13.92
14	29.	28.34	0.66	25.56	3.44	23.48	5.52
15	49.	28.41	20.59	25.97	23.03	24.44	24.56
16	59.	30.47	28.53	30.33	28.67	31.26	27.74
17	60.	33.32	26.68	36.05	23.95	39.75	20.25
18	15.	35.99	-20.99	41.11	-26.11	46.84	-31.84
19	24.	33.89	-9.89	36.40	-12.40	38.95	-14.95
20	25.	32.90	-7.90	34.18	-9.18	35.22	-10.22
21	22.	32.11	-10.11	32.47	-10.47	32.49	-10.49
22	42.	31.10	10.90	30.41	11.59	29.39	12.61
23	54.	32.19	21.81	32.66	21.34	32.90	21.10
24	29.	34.37	-5.37	36.97	-7.97	39.32	-10.32
25	49.	33.83	15.17	35.64	13.36	36.95	12.05
26	34.	35.35	-1.35	38.49	-4.49	41.01	-7.01
27	52.	35.21	16.79	37.91	14.09	39.73	12.27
28	57.	36.89	20.11	41.00	16.00	44.04	12.96
29	92.	38.90	53.10	44.61	47.39	48.95	43.05
30	49.	44.21	4.79	54.66	-5.66	63.30	-14.30
31	34.	44.69	-10.69	54.57	-20.57	61.79	-27.79
32	49.	43.62	5.38	51.44	-2.44	55.88	-6.88
33	45.	44.16	0.84	51.74	-6.74	55.49	-10.49
AVERAGE FORECASTING ERROR			4.3520		1.5704		-0.8317
AVERAGE % FORECASTING ERROR			45.7640		50.6342		57.1835
AVG |FORECASTING ERROR|/INCIDENT			0.3672		0.3903		0.4286
AVG SQUARED FORECASTING ERROR			336.4431		334.3916		364.3962
MAX ABSOLUTE FORECASTING ERROR			53.0963		47.3928		43.0513

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 5
ALPHA LEVEL = .30

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	23.	41.41	-18.41	45.48	-22.48	44.15	-21.15
11	27.	35.89	-8.89	33.21	-6.21	25.54	1.46
12	10.	33.22	-23.22	28.68	-18.68	21.45	-11.45
13	14.	26.26	-12.26	16.11	-2.11	5.44	8.56
14	29.	22.58	6.42	11.80	17.20	3.70	25.30
15	49.	24.51	24.49	18.89	30.11	18.37	30.63
16	59.	31.85	27.15	35.27	23.73	43.94	15.06
17	60.	40.00	20.00	50.53	9.47	63.72	-3.72
18	15.	46.00	-31.00	59.37	-44.37	71.45	-56.45
19	24.	36.70	-12.70	36.76	-12.76	31.90	-7.90
20	25.	32.89	-7.89	29.12	-4.12	21.89	3.11
21	22.	30.52	-8.52	25.52	-3.52	19.22	2.78
22	42.	27.97	14.03	21.91	20.09	16.44	25.56
23	54.	32.18	21.82	32.15	21.85	34.35	19.65
24	29.	38.72	-9.72	45.25	-16.25	53.35	-24.35
25	49.	35.81	13.19	37.46	11.54	38.25	10.75
26	34.	39.76	-5.76	44.88	-10.88	48.90	-14.90
27	52.	38.04	13.96	39.89	12.11	39.43	12.57
28	57.	42.22	14.78	47.71	9.29	51.03	5.97
29	92.	46.66	45.34	54.93	37.07	60.04	31.96
30	49.	60.26	-11.26	79.65	-30.65	94.35	-45.35
31	34.	56.88	-22.88	67.08	-33.08	68.17	-34.17
32	49.	50.02	-1.02	50.29	-1.29	41.13	7.87
33	45.	49.71	-4.71	49.60	-4.60	42.80	2.20
AVERAGE FORECASTING ERROR			0.9565		-0.7727		-0.6676
AVERAGE % FORECASTING ERROR			52.9250		55.5591		59.1285
AVG |FORECASTING ERROR|/INCIDENT			0.4024		0.4279		0.4484
AVG SQUARED FORECASTING ERROR			344.1978		415.6296		508.9370
MAX ABSOLUTE FORECASTING ERROR			45.3429		-44.3737		-56.4478

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 5
ALPHA LEVEL = .50

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	23.	42.36	-19.36	34.92	-11.92	20.98	2.02
11	27.	32.68	-5.68	19.28	7.72	6.35	20.65
12	10.	29.84	-19.84	20.30	-10.30	17.70	-7.70
13	14.	19.92	-5.92	5.23	8.77	-1.22	15.22
14	29.	16.96	12.04	6.66	22.34	7.81	21.19
15	49.	22.98	26.02	23.85	25.15	35.60	13.40
16	59.	35.99	23.01	49.43	9.57	67.89	-8.89
17	60.	47.49	12.51	65.72	-5.72	79.73	-19.73
18	15.	53.75	-38.75	69.11	-54.11	73.26	-58.26
19	24.	34.37	-10.37	22.68	1.32	-2.30	26.30
20	25.	29.19	-4.19	18.15	6.85	6.32	18.68
21	22.	27.09	-5.09	19.48	2.52	16.99	5.01
22	42.	24.55	17.45	18.20	23.80	18.21	23.79
23	54.	33.27	20.73	38.82	15.18	50.73	3.27
24	29.	43.64	-14.64	56.78	-27.78	70.32	-41.32
25	49.	36.32	12.68	35.57	13.43	28.45	20.55
26	34.	42.66	-8.66	48.63	-14.63	51.78	-17.78
27	52.	38.33	13.67	36.98	15.02	31.25	20.75
28	57.	45.16	11.84	51.33	5.67	55.97	1.03
29	92.	51.08	40.92	60.08	31.92	65.24	26.76
30	49.	71.54	-22.54	96.50	-47.50	115.04	-66.04
31	34.	60.27	-26.27	61.48	-27.48	47.00	-13.00
32	49.	47.14	1.86	34.60	14.40	13.62	35.38
33	45.	48.07	-3.07	42.73	2.27	39.44	5.56
AVERAGE FORECASTING ERROR			0.3482		0.2696		1.1187
AVERAGE % FORECASTING ERROR			52.0390		55.9140		68.4383
AVG |FORECASTING ERROR|/INCIDENT			0.3999		0.4298		0.5220
AVG SQUARED FORECASTING ERROR			349.6833		461.9526		677.5090
MAX ABSOLUTE FORECASTING ERROR			40.9176		-54.1136		-66.0380

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 5
ALPHA LEVEL = .70

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	23.	38.92	-15.92	27.11	-4.11	21.44	1.56
11	27.	27.78	-0.78	13.09	13.91	8.51	18.49
12	10.	27.23	-17.23	22.28	-12.28	30.65	-20.65
13	14.	15.17	-1.17	1.62	12.38	-4.47	18.47
14	29.	14.35	14.65	9.47	19.53	16.31	12.69
15	49.	24.61	24.39	33.39	15.61	49.12	-0.12
16	59.	41.68	17.32	61.39	-2.39	77.04	-18.04
17	60.	53.80	6.20	71.84	-11.84	74.86	-14.86
18	15.	58.14	-43.14	67.89	-52.89	60.51	-45.51
19	24.	27.94	-3.94	0.67	23.33	-38.57	62.57
20	25.	25.18	-0.18	14.24	10.76	18.80	6.20
21	22.	25.05	-3.05	21.64	0.36	30.54	-8.54
22	42.	22.92	19.08	19.76	22.24	22.67	19.33
23	54.	36.27	17.73	48.68	5.32	65.13	-11.13
24	29.	48.68	-19.68	64.81	-35.81	73.47	-44.47
25	49.	34.90	14.10	25.97	23.03	3.49	45.51
26	34.	44.77	-10.77	51.96	-17.96	61.34	-27.34
27	52.	37.23	14.77	31.85	20.15	22.09	29.91
28	57.	47.57	9.43	56.29	0.71	67.47	-10.47
29	92.	54.17	37.83	63.39	28.61	67.24	24.76
30	49.	80.65	-31.65	109.90	-60.90	131.08	-82.08
31	34.	58.50	-24.50	45.11	-11.11	8.84	25.16
32	49.	41.35	7.65	20.19	28.81	1.53	47.47
33	45.	46.70	-1.70	45.71	-0.71	60.28	-15.28
AVERAGE FORECASTING ERROR			0.3924		0.6144		0.5678
AVERAGE % FORECASTING ERROR			48.3371		61.3605		83.7126
AVG |FORECASTING ERROR|/INCIDENT			0.3784		0.4610		0.6475
AVG SQUARED FORECASTING ERROR			348.6787		553.7310		1028.4766
MAX ABSOLUTE FORECASTING ERROR			-43.1413		-60.8972		-82.0797

UNCLASSIFIED

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 5
ALPHA LEVEL = .90

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	23.	36.17	-13.17	25.34	-2.34	30.59	-7.59
11	27.	24.32	2.68	11.38	15.62	9.80	17.20
12	10.	26.73	-16.73	27.85	-17.85	41.75	-31.75
13	14.	11.67	2.33	-3.27	17.27	-17.95	31.95
14	29.	13.77	15.23	14.37	14.63	28.44	0.56
15	49.	27.48	21.52	41.25	7.75	55.82	-6.82
16	59.	46.85	12.15	67.60	-8.60	76.03	-17.03
17	60.	57.78	2.22	70.80	-10.80	63.90	-3.90
18	15.	59.78	-44.78	63.07	-48.07	52.67	-37.67
19	24.	19.48	4.52	-20.49	44.49	-64.80	88.80
20	25.	23.55	1.45	23.62	1.38	59.23	-34.23
21	22.	24.85	-2.85	26.17	-4.17	30.97	-8.97
22	42.	22.29	19.71	19.85	22.15	16.58	25.42
23	54.	40.03	13.97	57.53	-3.53	77.14	-23.14
24	29.	52.60	-23.60	66.93	-37.93	65.71	-36.71
25	49.	31.36	17.64	11.55	37.45	-22.71	71.71
26	34.	47.24	-13.24	61.13	-27.13	91.41	-57.41
27	52.	35.32	16.68	24.80	27.20	3.41	48.59
28	57.	50.33	6.67	64.29	-7.29	86.63	-29.63
29	92.	56.33	35.67	63.73	28.27	59.40	32.60
30	49.	88.43	-39.43	121.27	-72.27	146.29	-97.29
31	34.	52.94	-18.94	20.74	13.26	-41.81	75.81
32	49.	35.89	13.11	15.63	33.37	21.31	27.69
33	45.	47.69	-2.69	57.46	-12.46	88.06	-43.06
AVERAGE FORECASTING ERROR			0.4212		0.4345		-0.6199
AVERAGE % FORECASTING ERROR			49.5253		71.8135		116.3444
AVG |FORECASTING ERROR|/INCIDENT			0.3828		0.5464		0.9073
AVG SQUARED FORECASTING ERROR			361.0212		749.2463		1933.1194
MAX ABSOLUTE FORECASTING ERROR			-44.7785		-72.2733		-97.2912

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 6
ALPHA LEVEL = .10

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	70.	77.70	-7.70	84.29	-14.29	87.96	-17.96
11	63.	76.93	-13.93	82.09	-19.09	83.96	-20.96
12	35.	75.54	-40.54	78.79	-43.79	78.56	-43.56
13	49.	71.48	-22.48	70.36	-21.36	65.77	-16.77
14	71.	69.23	1.77	65.97	5.03	59.71	11.29
15	106.	69.41	36.59	66.65	39.35	61.52	44.48
16	124.	73.07	50.93	74.24	49.76	73.56	50.44
17	121.	78.16	42.84	84.31	36.69	88.68	32.32
18	64.	82.45	-18.45	92.27	-28.27	99.86	-35.86
19	64.	80.60	-16.60	87.59	-23.59	91.60	-27.60
20	95.	78.94	16.06	83.57	11.43	84.82	10.18
21	64.	80.55	-16.55	86.32	-22.32	88.59	-24.59
22	69.	78.89	-9.89	82.44	-13.44	82.24	-13.24
23	81.	77.90	3.10	80.10	0.90	78.59	2.41
24	55.	78.21	-23.21	80.50	-25.50	79.23	-24.23
25	91.	75.89	15.11	75.63	15.37	71.93	19.07
26	66.	77.40	-11.40	78.68	-12.68	76.89	-10.89
27	94.	76.26	17.74	76.27	17.73	73.39	20.61
28	77.	78.04	-1.04	79.82	-2.82	79.00	-2.00
29	133.	77.93	55.07	79.43	53.57	78.41	54.59
30	80.	83.44	-3.44	90.30	-10.30	94.73	-14.73
31	69.	83.10	-14.10	88.92	-19.92	91.89	-22.89
32	81.	81.69	-0.69	85.52	-4.52	86.20	-5.20
33	74.	81.62	-7.62	85.00	-11.00	85.16	-11.16

	1ST ORDER	2ND ORDER	3RD ORDER
AVERAGE FORECASTING ERROR	1.3149	-1.7944	-1.9272
AVERAGE % FORECASTING ERROR	24.8977	28.7508	30.5616
AVG |FORECASTING ERROR|/INCIDENT	0.2357	0.2651	0.2832
AVG SQUARED FORECASTING ERROR	580.9175	641.1011	705.9478
MAX ABSOLUTE FORECASTING ERROR	55.0675	53.5683	54.5875

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 6
ALPHA LEVEL = .30

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	70.	83.23	-13.23	87.89	-17.89	88.38	-18.38
11	63.	79.26	-16.26	78.55	-15.55	73.53	-10.53
12	35.	74.38	-39.38	69.01	-34.01	60.83	-25.83
13	49.	62.57	-13.57	46.99	2.01	31.06	17.94
14	71.	58.50	12.50	43.52	27.48	32.97	38.03
15	106.	62.25	43.75	55.52	50.48	56.38	49.62
16	124.	75.37	48.63	83.79	40.21	99.53	24.47
17	121.	89.96	31.04	110.44	10.56	133.52	-12.52
18	64.	99.27	-35.27	122.92	-58.92	142.25	-78.25
19	64.	88.69	-24.69	94.66	-30.66	90.52	-26.52
20	95.	81.28	13.72	78.06	16.94	65.96	29.04
21	64.	85.40	-21.40	87.25	-23.25	83.87	-19.87
22	69.	78.98	-9.98	73.86	-4.86	64.51	4.49
23	81.	75.99	5.01	69.41	11.59	61.41	19.59
24	55.	77.49	-22.49	74.39	-19.39	72.27	-17.27
25	91.	70.74	20.26	61.83	29.17	54.52	36.48
26	66.	76.82	-10.82	76.65	-10.65	80.30	-14.30
27	94.	73.57	20.43	70.21	23.79	69.56	24.44
28	77.	79.70	-2.70	83.48	-6.48	90.16	-13.16
29	133.	78.89	54.11	80.72	52.28	83.46	49.54
30	80.	95.12	-15.12	112.64	-32.64	130.24	-50.24
31	69.	90.59	-21.59	98.31	-29.31	100.84	-31.84
32	81.	84.11	-3.11	83.04	-2.04	76.02	4.98
33	74.	83.18	-9.18	81.50	-7.50	75.97	-1.97

AVERAGE FORECASTING ERROR	-0.3899	-1.1930	-0.9181
AVERAGE % FORECASTING ERROR	28.4500	31.1205	34.6271
AVG |FORECASTING ERROR|/INCIDENT	0.2681	0.2941	0.3266
AVG SQUARED FORECASTING ERROR	640.4907	784.0879	966.3882
MAX ABSOLUTE FORECASTING ERROR	54.1088	-58.9187	-78.2471

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 6
ALPHA LEVEL = .50

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	70.	85.09	-15.09	85.82	-15.82	83.49	-13.49
11	63.	77.54	-14.54	70.37	-7.37	61.29	1.71
12	35.	70.27	-35.27	59.41	-24.41	51.19	-16.19
13	49.	52.64	-3.64	29.57	19.43	13.25	35.75
14	71.	50.82	20.18	37.47	33.53	39.02	31.98
15	106.	60.91	45.09	64.32	41.68	81.87	24.13
16	124.	83.45	40.55	107.71	16.29	137.32	-13.32
17	121.	103.73	17.27	136.13	-15.13	159.08	-38.08
18	64.	112.36	-48.36	137.20	-73.20	141.11	-77.11
19	64.	88.18	-24.18	76.42	-12.42	41.77	22.23
20	95.	76.09	18.91	58.12	36.88	34.59	60.41
21	64.	85.55	-21.55	86.01	-22.01	92.69	-28.69
22	69.	74.77	-5.77	64.23	4.77	56.57	12.43
23	81.	71.89	9.11	63.73	17.27	62.28	18.72
24	55.	76.44	-21.44	76.92	-21.92	84.83	-29.83
25	91.	65.72	25.28	55.24	35.76	48.23	42.77
26	66.	78.36	-12.36	85.76	-19.76	100.14	-34.14
27	94.	72.18	21.82	69.70	24.30	67.01	26.99
28	77.	83.09	-6.09	92.76	-15.76	103.56	-26.56
29	133.	80.05	52.95	81.83	51.17	79.36	53.64
30	80.	106.52	-26.52	133.89	-53.89	158.24	-78.24
31	69.	93.26	-24.26	93.69	-24.69	78.91	-9.91
32	81.	81.13	-0.13	69.21	11.79	49.48	31.52
33	74.	81.07	-7.07	75.04	-1.04	71.07	2.93
AVERAGE FORECASTING ERROR			-0.6297		-0.6066		-0.0148
AVERAGE % FORECASTING ERROR			28.8237		33.5039		40.3129
AVG |FORECASTING ERROR|/INCIDENT			0.2729		0.3166		0.3854
AVG SQUARED FORECASTING ERROR			660.5105		898.8552		1324.6821
MAX ABSOLUTE FORECASTING ERROR			52.9549		-73.1997		-78.2389

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 6
ALPHA LEVEL = .70

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	70.	85.22	-15.22	86.36	-16.36	94.24	-24.24
11	63.	74.57	-11.57	64.25	-1.25	55.16	7.84
12	35.	66.47	-31.47	55.28	-20.28	51.67	-16.67
13	49.	44.44	4.56	19.06	29.94	3.78	45.22
14	71.	47.63	23.37	43.21	27.79	59.59	11.41
15	106.	63.99	42.01	79.02	26.98	103.39	2.61
16	124.	93.40	30.60	127.31	-3.31	153.51	-29.51
17	121.	114.82	6.18	146.42	-25.42	151.96	-30.96
18	64.	119.15	-55.15	132.95	-68.95	116.82	-52.82
19	64.	80.54	-16.54	46.08	17.92	-7.02	71.02
20	95.	68.96	26.04	47.04	47.96	43.66	51.34
21	64.	87.19	-23.19	98.84	-34.84	131.39	-67.39
22	69.	70.96	-1.96	58.22	10.78	43.60	25.40
23	81.	69.59	11.41	64.40	16.60	67.56	13.44
24	55.	77.58	-22.58	84.01	-29.01	96.58	-41.58
25	91.	61.77	29.23	47.90	43.10	31.36	59.64
26	66.	82.23	-16.23	98.53	-32.53	123.74	-57.74
27	94.	70.87	23.13	64.40	29.60	49.19	44.81
28	77.	87.06	-10.06	101.31	-24.31	117.47	-40.47
29	133.	80.02	52.98	77.25	55.75	65.08	67.92
30	80.	117.11	-37.11	153.36	-73.36	188.74	-108.74
31	69.	91.13	-22.13	76.03	-7.03	35.29	33.71
32	81.	75.64	5.36	55.62	25.38	38.47	42.53
33	74.	79.39	-5.39	77.14	-3.14	89.76	-15.76
AVERAGE FORECASTING ERROR			-0.5715		-0.3329		-0.3744
AVERAGE % FORECASTING ERROR			29.2441		37.5546		54.1525
AVG |FORECASTING ERROR|/INCIDENT			0.2761		0.3542		0.5078
AVG SQUARED FORECASTING ERROR			680.0732		1130.5610		2194.6121
MAX ABSOLUTE FORECASTING ERROR			-55.1457		-73.3624		-108.7370

FORECASTING LEVEL OF INCIDENT ACTIVITY
AREA NUMBER 6
ALPHA LEVEL = .90

MONTH NUMBER	NUMBER OF INCIDENTS	1ST ORDER FORECASTS	FORECAST ERROR	2ND ORDER FORECASTS	FORECAST ERROR	3RD ORDER FORECASTS	FORECAST ERROR
10	70.	86.24	-16.24	92.41	-22.41	116.70	-46.70
11	63.	71.62	-8.62	57.63	5.37	39.89	23.11
12	35.	63.86	-28.86	54.70	-19.70	57.77	-22.77
13	49.	37.89	11.11	10.99	38.01	-6.43	55.43
14	71.	47.89	23.11	55.20	15.80	87.66	-16.66
15	106.	68.69	37.31	90.22	15.78	107.69	-1.69
16	124.	102.27	21.73	138.00	-14.00	153.95	-29.95
17	121.	121.83	-0.83	144.96	-23.96	133.94	-12.94
18	64.	121.08	-57.08	122.65	-58.65	99.98	-35.98
19	64.	69.71	-5.71	18.49	45.51	-36.56	100.56
20	95.	64.57	30.43	54.31	40.69	89.77	5.23
21	64.	91.96	-27.96	118.32	-54.32	158.49	-94.49
22	69.	66.80	2.20	44.27	24.73	-0.60	69.60
23	81.	68.78	12.22	68.51	12.49	86.29	-5.29
24	55.	79.78	-24.78	90.75	-35.75	103.77	-48.77
25	91.	57.48	33.52	36.27	54.73	5.40	85.60
26	66.	87.65	-21.65	115.70	-49.70	161.87	-95.87
27	94.	68.16	25.84	51.49	42.51	11.38	82.62
28	77.	91.42	-14.42	113.00	-36.00	147.25	-70.25
29	133.	78.44	54.56	67.63	65.37	38.66	94.34
30	80.	127.54	-47.54	175.57	-95.57	231.49	-151.49
31	69.	84.75	-15.75	46.77	22.23	-33.65	102.65
32	81.	70.58	10.42	52.60	28.40	64.57	16.43
33	74.	79.96	-5.96	87.54	-13.54	114.30	-40.30

AVERAGE FORECASTING ERROR	-0.5390	-0.4990	-1.5650
AVERAGE % FORECASTING ERROR	30.2165	47.1228	75.2629
AVG |FORECASTING ERROR|/INCIDENT	0.2837	0.4405	0.6903
AVG SQUARED FORECASTING ERROR	731.5652	1635.5786	4492.7266
MAX ABSOLUTE FORECASTING ERROR	-57.0827	-95.5652	-151.4938

```
//     EXEC   FORTCLG,REGION.GO=150K,TIME.GO=5
//FORT.SYSIN   DD *
C   PROGRAM FORECASTS INCIDENT ACTIVITY LEVELS BY MONTH USING FIRST,
C   SECOND, AND THIRD ORDER EXPONENTIAL SMOOTHING.
      DIMENSION X(33)
C   THE FIRST (OUTER) LOOP CHANGES THE AREA TO BE FORECASTED
      DO 20 J=1,6
      READ(5,1001) X
 1001 FORMAT(20F4.0,/,13F4.0)
C   COMPUTE INITIAL SMOOTHED VALUES USING LEAST SQUARES ESTIMATION WITH
C   N=3 MONTHS AND USING NINE MONTHS DATA.  COMPUTATION DOES NOT DEPEND
C   ON ALPHA LEVEL SELECTED FOR FORECASTING
      SSV4=(X(1)+X(2)+X(3))/3.0
      SSV5=(X(2)+X(3)+X(4))/3.0
      SSV6=(X(3)+X(4)+X(5))/3.0
      SSV7=(X(4)+X(5)+X(6))/3.0
      SSV8=(X(5)+X(6)+X(7))/3.0
      SSV9=(X(6)+X(7)+X(8))/3.0
      DSV7=(SSV5+SSV6+SSV7)/3.0
      DSV8=(SSV6+SSV7+SSV8)/3.0
      DSV9=(SSV7+SSV8+SSV9)/3.0
      TSV=(DSV7+DSV8+DSV9)/3.0
      DSV=DSV9
      SSV=SSV9
C   THE SECOND (MIDDLE) LOOP SETS THE ALPHA LEVEL FOR COMPUTATION OF
C   FORECASTS.  .1, .3, .5, .7, AND .9 VALUES OF ALPHA (A) ARE USED.
      A=-.10
      DO 40 L=1,5
      A=A+.20
      WRITE(6,1002) J,A
 1002 FORMAT('1'////////////////,'/',T47,'FORECASTING LEVEL OF INCIDENT A
     1CTIVITY',/,T58,'AREA NUMBER ',I1,/,T56,'ALPHA LEVEL = ',F3.2,///,T
     221,'MONTH    NUMBER OF    1ST ORDER   FORECAST    2ND ORDER   FORE
     3CAST    3RD ORDER   FORECAST',/,T21,'NUMBER   INCIDENTS    FORECAS
     4TS    ERROR        FORECASTS    ERROR       FORECASTS    ERROR')
      SERR1=0.0
      SERR2=0.0
      SERR3=0.0
      AMAX1=0.0
      AMAX2=0.0
      AMAX3=0.0
      SSQ1=0.0
      SSQ2=0.0
      SSQ3=0.0
      PERR1 = 0.0
      PERR2 = 0.0
      PERR3 = 0.0
      SPERR1 = 0.0
```

```
      SPERR2 = 0.0
      SPERR3 = 0.0
      SAERR1 = 0.0
      SAERR2 = 0.0
      SAERR3 = 0.0
      SUMX = 0.0
C   THE THIRD (INNER) LOOP COMPUTES FORECASTS BY MONTH FOR A SET ALPHA
C   LEVEL AND GEOGRAPHICAL AREA
      DO 10 I=10,33
      SSV=A*X(I-1)+(1-A)*SSV
      DSV=A*SSV+(1.0-A)*DSV
      EST2=2.0*SSV-DSV+(A/(1.0-A))*(SSV-DSV)
      TSV=A*DSV+(1.0-A)*TSV
      EST3=((2.0*(3.0-3.0*A+A*A)*SSV) - ((6.0-2.0*A)*DSV)+(2.0*TSV))/(2.
     10-4.0*A+2.0*A*A)
      ERR1=X(I)-SSV
      ERR2=X(I)-EST2
      ERR3=X(I)-EST3
      IF(X(I).LE.0.0) GO TO 9999
      PERR1 = ((ABS(ERR1))/X(I))*100.0
      PERR2 = ((ABS(ERR2))/X(I))*100.0
      PERR3 = ((ABS(ERR3))/X(I))*100.0
 9999 SPERR1 = SPERR1 + PERR1
      SPERR2 = SPERR2 + PERR2
      SPERR3 = SPERR3 + PERR3
      SAERR1 = SAERR1 + ABS(ERR1)
      SAERR2 = SAERR2 + ABS(ERR2)
      SAERR3 = SAERR3 + ABS(ERR3)
      SUMX = SUMX + X(I)
      SERR1=SERR1+ERR1
      SERR2=SERR2+ERR2
      SERR3=SERR3+ERR3
      IF(ABS(ERR1).GE.ABS(AMAX1)) GO TO 11
      GO TO 12
   11 AMAX1=ERR1
   12 IF(ABS(ERR2).GE.ABS(AMAX2)) GO TO 21
      GO TO 22
   21 AMAX2=ERR2
   22 IF(ABS(ERR3).GE.ABS(AMAX3)) GO TO 31
      GO TO 32
   31 AMAX3=ERR3
   32 SSQ1=SSQ1+ERR1*ERR1
      SSQ2=SSQ2+ERR2*ERR2
      SSQ3=SSQ3+ERR3*ERR3
      WRITE(6,1003)I,X(I),SSV,ERR1,EST2,ERR2,EST3,ERR3
 1003 FORMAT(T24,I2,T32,F4.0,T44,F6.2,T56,F6.2,T68,F6.2,T80,F6.2,T92,F6.
     12,T102,F8.2)
   10 CONTINUE
```

```
      ASUM1=SERR1/24.0
      ASUM2=SERR2/24.0
      ASUM3=SERR3/24.0
      WRITE(6,1004) ASUM1,ASUM2,ASUM3
      APER1 = SPERR1/24.0
      APER2 = SPERR2/24.0
      APER3 = SPERR3/24.0
      WRITE(6,1007) APER1, APER2, APER3
      AAERR1 = SAERR1/SUMX
      AAERR2 = SAERR2/SUMX
      AAERR3 = SAERR3/SUMX
      WRITE(6,1008) AAERR1,AAERR2,AAERR3
      ASQ1=SSQ1/24.0
      ASQ2=SSQ2/24.0
      ASQ3=SSQ3/24.0
      WRITE(6,1006) ASQ1,ASQ2,ASQ3
      WRITE(6,1005) AMAX1,AMAX2,AMAX3
   40 CONTINUE
   20 CONTINUE
 1004 FORMAT('0',T21,'AVERAGE FORECASTING ERROR',T53,F10.4,T77,F10.4,T10
     11,F10.4)
 1005 FORMAT('0',T21,'MAX ABSOLUTE FORECASTING ERROR',T53,F10.4,T77,F10.
     14,T101,F10.4)
 1006 FORMAT('0',T21,'AVG SQUARED FORECASTING ERROR',T53,F10.4,T77,F10.4
     1,T101,F10.4)
 1007 FORMAT('0',T21,'AVERAGE % FORECASTING ERROR',T53,F10.4,T77,F10.4,T
     1101,F10.4)
 1008 FORMAT('0',T21,'AVG |FORECASTING ERROR|/INCIDENT',T53,F10.4,T77,F1
     10.4,T101,F10.4)
      STOP
      END
//GO.FT06F001 DD SYSOUT=A,SPACE=(CYL,(5,1))
//GO.SYSIN  DD *
  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  3.  0.  1.  1.  3.  2.  3.  5.  6.
  1.  1.  6.  3.  3.  3.  2.  0.  1.  0.  0.  1.  0.
  0.  4.  2.  0.  0.  3.  2.  0.  1.  3.  1.  2.  0.  1. 16.  7.  3.  5.  1. 13.
  5.  5.  3.  0.  6.  2.  0.  1.  5.  0.  0.  0.  0.
 10.  6.  4.  7. 16. 18. 14.  6. 10. 10.  4.  6.  2.  3.  5.  6.  1.  3.  1.  5.
  0.  0.  2.  5.  6.  2.  8.  1. 11. 12.  5.  6.  4.
  5.  3.  1.  4.  5.  7. 12.  4.  9.  4. 14. 10.  9.
  7.  4.  1.  3.  9.  9.  7. 26. 27. 13. 16. 10. 12. 15. 20. 20. 24. 11. 17. 17.
 42. 39. 52. 27. 28. 28. 36. 37. 35. 23. 27. 10. 14. 29. 49. 59. 60. 15. 24. 25.
 22. 42. 54. 29. 49. 34. 52. 57. 92. 49. 34. 49. 45.
 72. 66. 75. 58. 67. 75. 68. 87. 87. 70. 63. 35. 49. 71.106.124.121. 64. 64. 95.
 64. 69. 81. 55. 91. 66. 94. 77.133. 80. 69. 81. 74.
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DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) Naval Postgraduate School Monterey, California 93940	2a. REPORT SECURITY CLASSIFICATION Confidential 2b. GROUP Group-3

3. REPORT TITLE

ANALYSIS OF INSURGENT INCIDENTS IN THAILAND (U)

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)
Master's Thesis; March 1971

5. AUTHOR(S) (First name, middle initial, last name)

JAN VORIS HARVEY

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1971	127	12

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO.	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.	

10. DISTRIBUTION STATEMENT

[redacted]

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
	Naval Postgraduate School Monterey, California 93940

13. ABSTRACT

(U) A general survey is made on the data collected by the Village Information System, Thailand project. Principal component analysis and principal factor analysis data reduction techniques are applied to the data for selected areas in northeast Thailand and the results are compared. Algebraic models are applied to a selected variable of the data and forecasting techniques applied to each model to predict the value of the variable in the next time period. Conclusions are presented concerning the operational usefulness of the analytical techniques applied to the data.

DD FORM 1 NOV 65 1473 (PAGE 1)

S/N 0101-807-6811

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14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Factor Analysis						
Insurgency						
Thailand						

DD FORM 1 NOV 65 1473 (BACK)
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99-69